

FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

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EDITORIAL COMMENT.



WE are always very diffident about appearing to interfere in matters affecting the internal administration of the R.F.C., more particularly when methods of employment at the Front are concerned.

There is, however, a matter which intimately affects the efficiency of the flying service to which we think attention may usefully be called.

We are told that it is the practice in France to hand over to the newly-fledged pilots the new, fast machines which are replacing the older types, while leaving the latter to be flown by the men who have been flying at the Front often for many months. There may be good reasons for this, but if so they are not at once apparent. We quite appreciate that the new men have probably been trained on the later types of machines, and are thus better qualified, initially, to fly them. Against that we have to set the fact that these new pilots are quite inexperienced, for the most part, in the manners and customs of Hun airmen, which the older men have learnt until they know them backwards. It would, surely, have been sound policy to have brought back a number of the more experienced pilots to go through a course of flying on the new machines during the comparatively quiet time of the past two months, supposing their want of acquaintance with the new types to have been

the difficulty. It appears to have been too readily assumed that one pilot is as good as another, whereas there must of necessity be a great deal of difference between the one who has had a year's experience of fighting in the air and the one whose wings, if we may put it that way, have only just been fledged. The point is one that might well engage the attention of the higher direction of the R.F.C.

The Future of the Air.

General Brancker's lecture before the members of the Aeronautical Society last week gives a good deal of food for serious thought to the student of the future of aviation. The gallant General took as his thesis the training of military pilots. It is not necessary here to follow him through the whole of his most interesting discourse, but there are one or two points upon which it will be useful to dwell briefly. Flying from the practical point of view, he says—i.e., from the standpoint of getting about from place to place—has become easy and comparatively safe, and therefore everyone who can should take it up, in peace time, as a means of travel and of recreation. The great factor against aviation for such purposes is our uncertain climate, but with experience and with reliable engines it is possible to fly in almost any weather short of a thick fog, in a hurricane or a violent thunderstorm.

To our way of thinking, General Brancker deserves the thanks of all who have the welfare of the movement at heart for his clear expression of facts that are only just beginning to be grasped by the lay mind. In spite of all the progress that has been made, and of the prominence into which the war has brought aviation, it is the most difficult thing in the world to get the average man in the street to believe it possible to ascend into the upper air without literally taking one's life in one's hands. He cannot believe, in spite of all the evidence, that flying for ordinary purposes, as apart from the conditions of active service, has become almost as easy and nearly as safe as riding a bicycle, or certainly a horse. As General Brancker says, very few Englishmen or Englishwomen with good nerves and health but could become pilots with sufficient experience.

It is this sort of propaganda to which aviation must look for its future. A great deal of missionary work was needed before the ordinary person believed in the motor car, and had it not been that that work was widely and efficiently carried out by the comparatively few its development must have been very greatly retarded. Before aerial travel can become comparable to motor travel on the high roads there

will have to be done a vast amount of the same sort of work. After all, it does require more effort of the imagination to believe that travel by aeroplane is really as safe as by car, besides having the added merit of far greater speed and freedom. It is not enough to merely assert that this is the case in order to carry conviction. But the war has helped to advance the cause in a manner and to an extent which we shall only begin to realise when peace comes again. It has brought into the movement many thousands who would never have been identified with it otherwise. Every one of those recruits will be a missionary for the great cause of aviation after the war, and thus the conversion of the layman will be far and away easier and more rapid than otherwise it would have been.

We do not want to indulge in far-fetched dreams of the future, but we can visualise within the next decade a movement that will have outgrown the most sanguine expectations of the present. There is no reason why Lord Montagu's ideal of regular aeroplane services between India and England should not have materialised into commonplace fact by then. We shall have regular Transatlantic aerial services. Internally, we shall have vast numbers of aircraft employed on all sorts of public services—passenger, postal, and commercial. The number of private machines in use will have become legion—it will be no more extraordinary to own an aeroplane than to possess a car. We doubt not that some of our readers will smile at these prophecies. The answer to that is: regard what has happened in the last decade. With that as a text, is it extravagant to expect anything less than we have outlined?

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"Combing Out."

After a careful examination of the proposals of the Director of National Service, we cannot say that we are extremely enamoured of them. We are told that it is necessary to get men away from the non-essential trades and into those that are essential. By essential we understand trades that are directly or at least indirectly related to the production of munitions or other material of war. If people are not willing to volunteer from those non-essential trades, then we are point-blank informed that industrial conscription is to be the resort. To begin with, we do not believe that there are large numbers of men employed in the "non-essential" trades who would be of very much use in the "essential" ones without a longer or shorter period of training to fit them for their new spheres of work. Another point is that no two people are likely to agree upon a definition of what really constitutes a "non-essential" trade. As a matter of fact, we should hesitate to pronounce *any* trade non-essential, inasmuch—and the present record loan is an object-lesson in this connection—as we require money and yet more money to carry the war to a victorious end, and if we are going to cripple some and close down others of the trades that are providing a very large proportion of the sinews of war, then, without the very greatest judgment and discretion is used, we are simply killing the goose that lays the golden eggs.

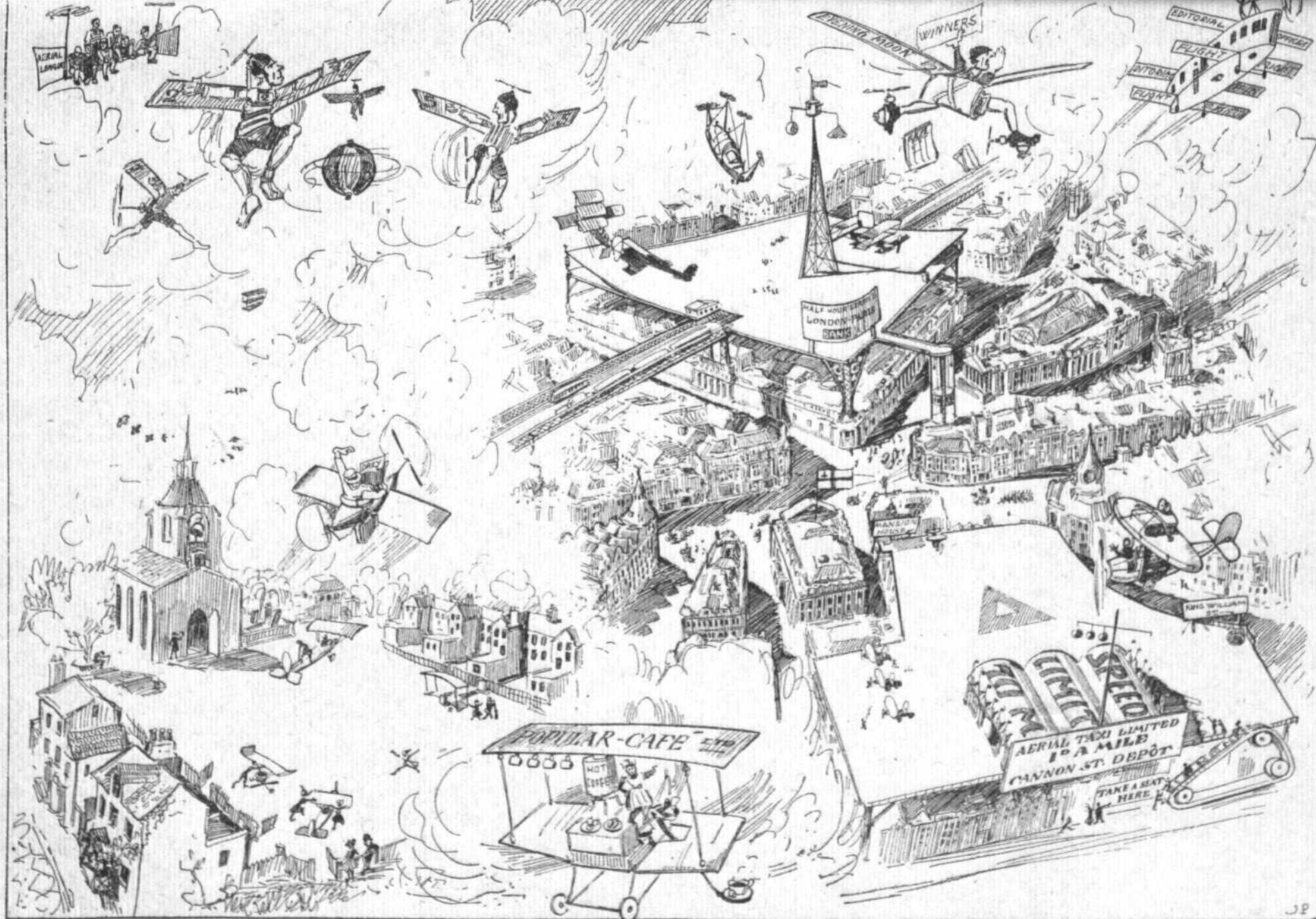
Before we proceed to the extremity of the kind of industrial conscription that is connoted by the threat to "comb out" the non-essential trades, we cannot avoid thinking that the Government would do well to think over a thorough sift of the Army itself. In the days when voluntary recruiting was the vogue,

in addition to hordes of hopelessly useless men as soldiers, many many thousands of skilled workers found their way into the ranks. Some proportion of the latter have been released for work in the munition factories, but there still remain large numbers of these men who would be worth much more to the State in the factories at home than they are behind the lines in France. Under the compulsory system of military service the waste of man-power has been appalling. Every day cases come to light in which men who are useful civilians are drafted into the ranks to make bad soldiers. This is the worst kind of economy for the State, inasmuch as it transforms the man who is of use to the community either as a worker or as a tax-payer into one who is a sheer and utterly useless burden. For this the tribunals are very largely to blame, though the central authorities cannot altogether be absolved. On the part of the latter there seems to be too much of a prevailing idea that the nation's resources are in the nature of a bottomless reservoir which is akin to the widow's cruse of oil. On the contrary, there is a distinct limit to our resources, and there is no apparent indication that this is recognised by the Government. The fact of the matter is that we are running decentralisation to death. We have created almost numberless departments, each with a Controller of Something or Other at its head. Quite naturally, each controller is out to get the best results for his department, and it is equally natural that, with the best intentions in the world, he tries for those results without too much thought for the effects produced thereby on other departments. We have the Army, the Navy, the Ministry of Munitions, the Food Controller, the Controller of National Service, all competing against each other in the labour market, with the consequence that the competition between the Army and the Navy for aeroplanes, which we have so often deplored, becomes a thing of little consequence in comparison. We have never liked the extension of the "Control" system, and the more we see of it the less we are inclined to modify our dislike. It is not that we object to being controlled, but we do object to the appalling waste of resources the system has produced. We are supposed to have a "Business Government" now, and we do submit to that Government that the present wastefulness of the whole system is not "business."

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A Fine Response.

At the end of November last the committee of the Society of British Aircraft Constructors appealed to the aircraft industry for support for the Air Services Winter Comforts Fund. In response to this appeal no less a sum than £6,785, of which details appear elsewhere in this issue of "FLIGHT," has been received, and has been divided in the rough proportions of two-thirds to the R.F.C. and one-third to the R.N.A.S. We congratulate Lady Henderson and Mrs. Murray Sueter on the splendid accession to the funds of the organisation in which they have so ably interested themselves since the first winter of the war. We doubt not that they will be able to make the best possible use of the money, and of more when it is forthcoming. So far as concerns this last, we understand that although this money has been handed over to the fund, the latter is by no means closed, so that if any of those who may not have had their attention called to the list feel inclined to contribute to so deserving a cause, there is no reason in the world why they should not do so.



The Future of Aviation.

Brigadier-General W. S. Brancker, Director of Air Organisation at the War Office, speaking at the Aeronautical Society last week: "I hope I have made it clear that actual flying from the practical point of view of getting from one place to another has become very easy and comparatively safe, and that therefore in Peace everyone who can should take it up as a means of travel and a means of recreation."

Mr. H. G. Wells, in a preface to the Grosvenor Gallery Aeronautical Exhibition: "When, a hundred years hence, the Lady Drogheda of that day opens her revival of this show—I hope for some quite other cause than the Red Cross—I doubt if there will be very much to add to the balloon and airship series. It will be pictures of multiplanes, helicopters, and every sort of great aeroplane that will make the bulk of the matter added to what we have here to-day."

HONOURS.

Honours for the R.F.C.

It was announced in a supplement to the *London Gazette*, issued on January 25th, that His Majesty the King had been graciously pleased to approve of the undermentioned honours and rewards for valuable services rendered in connection with the War, with effect from January 1st, 1917, inclusive:—

To be Lieutenant-General.

Major-Gen. (Temp. Lieut.-Gen.) Sir D. HENDERSON, K.C.B., D.S.O.

To be Brevet-Colonel.

Major and Brevet-Lieut.-Col. (Temp. Brig.-Gen.) W. S. BRANCKER, R.A.

To be Brevet-Majors.

Capt. (Temp. Lieut.-Col.) W. R. FREEMAN, D.S.O., M.C., Manch. R. and R.F.C.

Capt. (Temp. Lieut.-Col.) F. V. HOLT, D.S.O., Oxf. and Bucks L.I. and R.F.C.

Capt. (Temp. Major) C. E. C. RABAGLIATI, M.C., Yorks. L.I. and R.F.C.

To be Brevet-Major on Promotion to the rank of Captain.

Lieut. (Temp. Capt.) S. W. SMITH, R.A. and R.F.C.

Distinguished Service Order.

Capt. (Temp. Major) M. G. CHRISTIE, M.C., R.F.C. (S.R.).

Bar to Military Cross.

Capt. J. W. WOODHOUSE, M.C., R.F.C. (S.R.).

Military Cross.

Lieut. (Temp. Capt.) R. C. L. HOLME, Som. L.I. and R.F.C.

Temp. Capt. H. S. POWELL, Ceylon Rif. and R.F.C.

Meritorious Service Medal.

1st Cl. Air-Mech. E. E. CHILDS, R.F.C.

1st Cl. Air-Mech. T. P. WATSON, R.F.C.

In a supplement to the *London Gazette*, issued on January 26th, it was announced that His Majesty the King had been graciously pleased to confer the Military Cross on the undermentioned officer in recognition of his gallantry and devotion to duty in the field:—

Capt. R. H. FREEMAN, Worc. R., S.R., and R.F.C.

For conspicuous gallantry in action. He attacked and drove off an enemy aeroplane which had forced one of our machines to land. Later he landed and rescued the pilot under very difficult conditions. He set a fine example of courage and initiative.

"Mentioned in Despatches."

IN a list of names of officers and men brought to the notice of the Secretary of State for War for distinguished services rendered in connection with the war, published in a supplement to the *London Gazette* issued on January 25th, the following are included:—

Capt. G. H. BIRLEY, R.W. Surrey R. and R.F.C.

Capt. C. T. BLACK, R. Warwick R. and R.F.C.

Capt. A. DE B. BRANDON, D.S.O., M.C., R.F.C. (S.R.).

Major C. S. BURNETT, Highland L.I. and R.F.C.

Major M. C. CHRISTIE, M.C., R.F.C. (S.R.).

2nd Lieut. H. H. McL. FRASER, R.F.C. (S.R.).

Capt. D. GILLEY, Devon R. and R.F.C.

Capt. F. R. HEDGES, R.F.C.

2nd Lieut. W. G. HELPMAN, King Edward's H. and R.F.C.

Maj. (Temp. Lt.-Col.) T. C. R. HIGGINS, R. Lanc. R. and R.F.C.

Capt. (Temp. Lieut.-Col.) F. V. HOLT, D.S.O., Oxf. and Bucks L.I. and R.F.C.

2nd Lieut. C. A. HORE, N. Staffs. R. and R.F.C.

Capt. W. A. McCLAUGHRY, Aust. L.H. and R.F.C.

2nd Lieut. J. I. MACKAY, W. Riding R. and R.F.C.

Major A. C. E. MARSH, R.A. and R.F.C. (S.R.).

Capt. A. H. MORTON, R.F.A. and R.F.C.

Sub-Lieut. W. G. C. MUNSIE, R.N.V.R. and A.A.C.

Major L. DA C. PENN-GASKELL, Norf. R. and R.F.C. (killed).

Capt. H. S. POWELL, Ceylon Rif. and R.F.C.

2nd Lieut. I. V. PYOTT, R.F.C. (S.R.).

Capt. M. G. F. RICHARDSON, North'd. Fus. and R.F.C.

Capt. C. A. RIDLEY, D.S.O., M.C., R. Fus. and R.F.C.

Capt. E. E. ROBB, R.F.C. (S.R.).

Capt. W. L. ROBINSON, V.C., Worcester R. and R.F.C.

2nd Lieut. F. SOWERY, D.S.O., R. Fus. and R.F.C.

Capt. J. SOWERY, R.W. Surrey R. and R.F.C.

2nd Lieut. W. J. TEMPEST, D.S.O., Gen. List and R.F.C.

Major A. A. B. THOMSON, R. War. R. and R.F.C.

Capt. H. TOMLINSON, M.C., R.F.C. (S.R.).

2nd Lieut. MCD. C. TURNER, R.F.C. (S.R.).

Major E. F. UNWIN, A.S.C. and R.F.C. (killed).

Capt. A. C. WILSON, Lrs. and R.F.C.

Capt. J. W. WOODHOUSE, M.C., R.F.C. (S.R.).

Sergt. B. J. BASTABLE, R.F.C.

Flight-Sergt. C. W. GOODCHILD, R.F.C.

1st Air-Mech. A. HELD, R.F.C.

Sergt.-Major A. E. HUTTON, R.F.C.

Sergt.-Major S. J. KEMP, R.F.C.

Flight-Sergt. G. F. PECK, R.F.C.

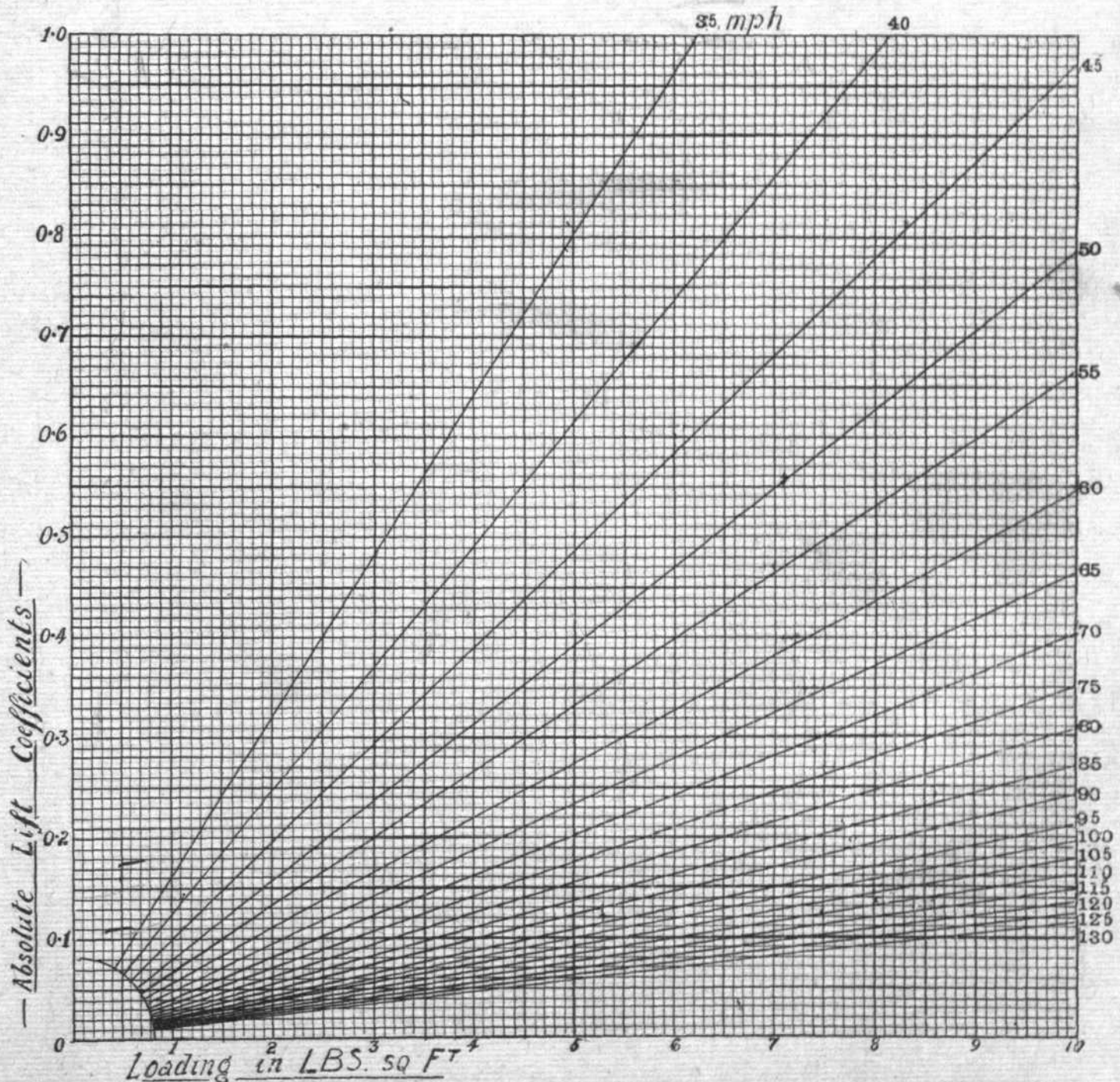


ARMY AVIATION TESTS IN THE UNITED STATES.—A remarkable photograph of the "landing" of Sergeant H. Blakeley during the army 115-mile test flight in America from New York to Philadelphia. The machine, in which G. H. Reynolds was a passenger, struck a flag pole when landing at the Meague Island Navy Yard, Philadelphia, plunging to the ground and crushing its lower plane and wheels. The photograph was snapped at the moment of striking the ground, and it will be noted that both pilot and passenger are still in their seats, from which instantly afterwards they were pitched.

WING LOADING AND LIFT COEFFICIENTS.

To facilitate choice of a suitable wing section for any particular performance, we have prepared the accompanying table and graph, the former for accurate calculations from speeds of 20 to 150 m.p.h. and the latter for approximate values. By way of example, if a certain wing section has a lift coefficient of 0.4, from the table the lift per sq. ft. at 80 m.p.h. is equal to $32.6 \times 0.4 = 13.04$ lbs./sq. ft. If the loading is 5 lbs./sq. ft., we see from the graph that a lift coefficient of 0.61 is required to give a minimum speed of 40 m.p.h.

Flight speed (m.p.h.)	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Conversion factor ...	2.04	2.25	2.46	2.69	2.93	3.18	3.43	3.71	3.98	4.27	4.59	4.90	5.24	5.59	5.86	6.23	6.60	7.02	7.37
Flight speed (m.p.h.)	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
Conversion factor ...	7.75	8.17	8.58	9.00	9.45	9.85	10.3	10.7	11.2	11.7	12.2	12.7	13.2	13.7	14.3	14.8	15.2	15.9	16.5
Flight speed (m.p.h.)	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
Conversion factor ...	17.1	17.7	18.3	18.9	19.6	20.2	20.9	21.5	22.2	22.9	23.6	24.2	24.9	25.7	26.4	27.2	27.9	28.6	29.4
Flight speed (m.p.h.)	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
Conversion factor ...	30.2	31.0	31.8	32.6	33.4	34.3	35.1	35.8	36.8	37.7	38.5	39.5	40.4	41.3	42.2	43.1	44.1	45.0	46.0
Flight speed (m.p.h.)	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114
Conversion factor ...	47.0	48.0	49.0	50.0	51.0	52.0	53.0	54.0	55.1	56.1	57.2	58.3	59.4	60.6	61.7	62.8	63.9	65.1	66.2
Flight speed (m.p.h.)	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133
Conversion factor ...	67.4	68.6	69.8	71.0	72.2	73.4	74.6	75.9	77.1	78.4	79.6	80.9	82.2	83.5	84.8	86.2	87.5	88.9	90.2
Flight speed (m.p.h.)	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150		
Conversion factor ...	91.5	92.9	94.3	95.7	97.1	98.5	99.9	101.4	102.8	104.3	105.7	107.2	108.7	110.2	111.7	113.2	114.7		



entirely on the weather and the number of aeroplanes available. During the winter it works out to about four months, but in the summer it is considerably shorter.

"The way in which war has forced a higher standard on us is remarkable. There is only one point which has simplified training during the past two and a half years. The modern designed aeroplane and the latest engine makes flying pure and simple much easier than it used to be. Aeroplanes are usually comparatively stable, and engines have a considerable reserve of power, and are far more reliable than in the old days, and these two factors have helped a good deal in the training of pilots.

"To sum up, before the war flying was comparatively difficult and was the chief factor in the pilot's training, military qualifications being considered of quite secondary importance. Now, flying up to a certain standard is extraordinarily easy, but the standard of military qualifications required is getting higher and higher and more difficult to attain, and at the same time the quality of flying demanded is growing greater every day. So our task at home grows harder.

"There is no such thing as a perfect aerodrome, and even a possible one is very difficult to find in England without either interfering with somebody else's rights or involving an enormous amount of labour and consequent waste of time. Climatic conditions and a sound soil are the two most important factors when selecting an aerodrome. In England, however, climatic conditions are so varied and unreliable that one can hardly say what part of England is best. So in this country a sound soil is probably the most important factor. After that, if the aerodrome is not a very big one, open ground in its immediate neighbourhood is of great importance. A debatable point is always how many pupils or how many aeroplanes can be effectively and safely trained and used at one aerodrome. We have generally assumed that the ideal number was about 60 pupils, and that for 60 pupils, including machines under repair and in reserve, we wanted about 60 aeroplanes, but of late bigger stations have been organised, although I have no statistics to prove which is the better and most economical system. Only a certain amount of room in the air and every one ought to be out in fine weather. An aerodrome, if possible, should be large enough to provide straights of about one mile in length in several directions. The use of these straights accelerates the first stages of preliminary training very greatly, but they are not absolutely necessary, and in a good many of our aerodromes at home no straight exists.

"The question of instructors has been a very difficult one from the start of the war. I suppose only about 10 per cent. of our flying officers are really good instructors. I have often had qualms on the subject, but the results have really been better than I expected originally. Instructors have many and various methods, and although it has been suggested that definite orders should be issued as to how pupils should be taught to fly, I have never been able to bring myself to issue such an order for fear of hampering initiative. The qualities required in an instructor are almost precisely the same as the qualities required in a man whose business it is to break in young horses—*infinite patience, great sympathy, good hands, and a clear, steady head.*

The next point which affects requirements of training is the provision of aeroplanes and engines. Here again controversy is eternally raging as to the best types to employ. Before the war the general idea was that a beginner should be taught on the box kite, and this idea has lasted inasmuch that to-day nearly all our pupils start their instruction on a Maurice-Farman. Personally I have been opposed to this system, but I may be wrong and have given way to the majority, but I think from the instructor's point of view the Maurice-Farman is a very nice safe machine on which to get the pupil through his first experience of dual control in the air, although in the actual movements necessary for controlling the machine it is different to almost any other machine in the Service. The 80-Gnome Avro has, beyond the Maurice-Farman, been our standby in advanced training, and is a thoroughly good machine for this purpose, light in handling, comparatively sensitive and not too difficult to fly. For some time pupils were successfully started on 80-Avros, but when Maurice-Farmans are available in sufficient quantities the consensus of opinion has been that it was better to stick to that machine for preliminary training. Now, however, we have a new type, the first of which has just flown, which I hope will eventually eliminate the box kite type of training machine altogether. Another point on which much argument arises is the use of stable machines for training. When stable machines first came in all the old conservative pilots shook their heads sadly and said that you could never make

a good pilot on a stable machine; that idea has died out, but there are still many instructors who insist that to make a good pilot he must first be trained on an unstable machine before being allowed to go on a stable one, to make him careful, but after all *landing* is the great thing, and stable machines are just as hard to land as unstable. Personally I am not at all sure that this is correct, and I believe that a pilot trained on stable machines from the start, after he has had about 30 hours' air experience, will be so confident and have such a good idea of what a machine ought to do in the air, that he will fly an unstable machine without even realising its instability, that is to say, of course, if he has been properly taught. So far as engines go, it is only natural, through the demands of war, that we have been forced to use our obsolete engines for training purposes. As a matter of fact, these obsolete engines are just what are not required for training purposes, because, being of an early type, they are more liable to failure than the modern types, and engine failure is just what one wants to avoid in training. The output of the trade, however, has precluded the manufacture in numbers of a special training engine. But now that the obsolescent engines are of newer types, this difficulty will tend to disappear.

"Now to turn to the actual process of training. I will consider it under two heads, technical training both on the ground and in the air and military training both on the ground and in the air. The first portion of technical training is the care of engines, rigging of aeroplanes, the use of the compass, the use of instruments and other such details. This is carried out at the two schools of military aeronautics; engines are taken down and erected and are run, samples of as many types as possible being provided to give the pupil wide experience. The same applies regarding the rigging and erection of aeroplanes, and pupils are made thoroughly conversant with the use of all the instruments. Thus a pupil before he actually learns to fly really has some knowledge of his engine, his machine, and its instruments. He then goes on to preliminary and advanced training squadrons, and continues to learn the enormous amount there is to learn on these heads by practical experience both in the air and in the squadron shops.

"A very debatable point in the actual training in flying is whether reserve squadrons should train pupils all through—*i.e.*, from the very start up to the time they get their wings—or whether, as is the system at present, they do preliminary training with one reserve squadron and go on to higher training in another. There are certain arguments for and against both systems, but we have adopted the second. The greatest argument in favour of the first system is that the one instructor can take a pupil and really get to know him and follow him right through his training; but practically preliminary training takes a shorter time than advanced training, and the system of military training is simplified by separating preliminary flying training from the advanced flying training. One great advantage of placing preliminary training and advanced training in separate squadrons is that the squadrons can be homogeneous in equipment. So much for the technical training; it is fairly simple, given a sound instructor and good weather.

"I have already explained the many military qualifications demanded from the modern pilot, and the military training on the ground, like the technical, is carried out at the schools of military aeronautics, where the pupil gets a good grounding in the use and care of the machine gun, wireless, artillery observation, photography and bomb-dropping, and this training he completes from practical experience when he gets on flying instruction.

"During his preliminary training in flying instruction his military training is still theoretical and on the ground, but in the advanced training squadrons he begins to fly in formations and to drop bombs or their equivalent at a target. He carries out practical artillery observation by means of powder puffs on the ground which represent the bursting of shells, and he is sent out across country to photograph various points in the neighbourhood, and until he has proved himself efficient in all these operations he cannot be a qualified pilot. Fighting in the air is also practised by various methods: Two machines may be sent up to manoeuvre against one another, both trying to attack; or the pupil is sent up whilst the instructor tries to attack him or *vice versa*; or the instructor goes out and attacks a group of his pupils returning from a cross-country flight, and so on.

"I think I have made it fairly clear that training in aviation from the military point of view is getting more and more complicated, but I hope that I have also made it clear that actual flying from the practical point of view of getting from one place to another has become very easy and com-

paratively safe, and that therefore in peace every one who can should take it up as a means of travel and a means of recreation. The great factor against aviation for such purposes is our uncertain climate, but with experience and with reliable engines it is possible to fly in almost any weather short of a thick fog, a hurricane or a violent thunderstorm. All these can be avoided by skill in navigation and a certain amount of weather wisdom.

"I am always racking my brains for possible improvements in our system of training, and perhaps to-night I shall get some ideas. But all these improvements are impossible to any extent during the stress of war, because the supply is for ever trying to catch up the demand, and the demand is for ever increasing both in numbers and quality. Sir Douglas Haig needs a certain fixed number of squadrons, and we must produce them or try to. In peace we cut our coat according to our cloth. The most unexpected people make good pilots, and very often the most promising ones never attain more than mediocrity in the air, and for this reason it has always seemed to me undesirable to lay down a stereotyped process of training. Personally I think that any sound man with sound nerves (and women, too, for that matter) can make a good, useful pilot, but it is only the exceptional individual who will make the really brilliant fighting pilot. Even the unsound—we have deaf people and people with wooden legs, &c.

There is always a great controversy as to the best age for flying. I think that there is no doubt the best age to learn to fly is as young as possible, just as a boy learns to ride, but during war this is impossible, as the pupil would be too young to fight. We take a few below the age of 18 now, but generally speaking 18 is rather young for the great strain of active service, and I prefer the man of 20 to 25. When you come to the older category I think everything depends on the life which the individual has led. A man of between 35 and 40 who has lived a hard life and is a good horseman will probably turn into a good pilot quicker than the man of from 25 to 30 who has spent his life in an office or doing nothing, but as a rule the older man will not stand the strain of active service fighting as long as the young man. The quality of horsemanship is quite a useful one in any would-be pilot. The requirements are just the same—good hands, a good head, steady nerves, and judgment. Flying is perhaps a little easier than riding because you sit in a comfortable armchair in a quiet machine instead of on a slippery saddle on a very lively horse. Generally speaking, I think it is only youth that makes it possible to become a really star pilot who can do almost anything in the air without loss of nerve. Probably the young man of 18 to 25 makes the best fighting pilot, whereas the older man will do best on long reconnaissance and artillery work, where less dash and more experience and endurance are required.

Very much depends on the character and temperament of each man, and the ideal in training would be to teach almost every pupil somewhat differently.

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"In the R.F.C. almost all pilots are officers—and the N.C.Os. very soon get commissions if they do well—and the observers, although officers as a rule, are absolutely under the control of the pilot. Our observers after a certain period of successful work in that capacity are allowed to learn to fly, and usually make very good pilots. Two completely opposite theories, of which I think ours has proved to be the best. I think there are certainly cases where German N.C.O. pilots have shown cowardice, and the officer observer has been unable to control them. Anyway, we go on with our system, and it works well, its only drawback being that we lose our observers just as they are getting really experienced, but experience is often equivalent to tiredness and caution.

"Another point of interest is the danger connected with training in flying. During peace the first consideration was to avoid accidents, which roused foolish questions in the House, and in consequence delayed progress and wasted everyone's time. Since the war started we have got away from that sort of nonsense, with the result that we take far greater risks than we used. In spite of this, the percentage of accidents has not really risen appreciably very much. A good many deaths are reported in the papers and frighten a certain number of people, but when you compare the number of deaths with the very large number of pupils in training and the very large number of hours in the air accomplished every day, the price is not great, and in the present stage of aviation the fact must be fearlessly accepted that no progress can be made without a certain cost in human life. Under peace conditions the ruling consideration will be the safety of the pupil, and we shall then be able to keep a man under training longer and take him much more slowly in the early stages, give him more instruction on the ground by means of various mechanical devices, and render him almost immune from the ordinary accident. There is one very satisfactory feature in looking back through the accidents which have occurred since the beginning of the war in training—there have been extraordinarily few cases of breakage in the air, which speaks very well for British construction and inspection. The most common type of accident is engine failure, followed by an effort to turn sharply into a possible landing-place and losing speed on the turn, which results in a nose-dive and serious smash. Even good and experienced pilots are prone to do this, and to me the only cure appears to be the avoidance of engine failure. This will assuredly come in peace, when we can devote more energy towards real reliability in the engine instead of extreme lightness and exaggerated performances.

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entirely on the weather and the number of aeroplanes available. During the winter it works out to about four months, but in the summer it is considerably shorter.

"The way in which war has forced a higher standard on us is remarkable. There is only one point which has simplified training during the past two and a half years. The modern designed aeroplane and the latest engine makes flying pure and simple much easier than it used to be. Aeroplanes are usually comparatively stable, and engines have a considerable reserve of power, and are far more reliable than in the old days, and these two factors have helped a good deal in the training of pilots.

"To sum up, before the war flying was comparatively difficult and was the chief factor in the pilot's training, military qualifications being considered of quite secondary importance. Now, flying up to a certain standard is extraordinarily easy, but the standard of military qualifications required is getting higher and higher and more difficult to attain, and at the same time the quality of flying demanded is growing greater every day. So our task at home grows harder.

"There is no such thing as a perfect aerodrome, and even a possible one is very difficult to find in England without either interfering with somebody else's rights or involving an enormous amount of labour and consequent waste of time. Climatic conditions and a sound soil are the two most important factors when selecting an aerodrome. In England, however, climatic conditions are so varied and unreliable that one can hardly say what part of England is best. So in this country a sound soil is probably the most important factor. After that, if the aerodrome is not a very big one, open ground in its immediate neighbourhood is of great importance. A debatable point is always how many pupils or how many aeroplanes can be effectively and safely trained and used at one aerodrome. We have generally assumed that the ideal number was about 60 pupils, and that for 60 pupils, including machines under repair and in reserve, we wanted about 60 aeroplanes, but of late bigger stations have been organised, although I have no statistics to prove which is the better and most economical system. Only a certain amount of room in the air and every one ought to be out in fine weather. An aerodrome, if possible, should be large enough to provide straights of about one mile in length in several directions. The use of these straights accelerates the first stages of preliminary training very greatly, but they are not absolutely necessary, and in a good many of our aerodromes at home no straight exists.

"The question of instructors has been a very difficult one from the start of the war. I suppose only about 10 per cent. of our flying officers are really good instructors. I have often had qualms on the subject, but the results have really been better than I expected originally. Instructors have many and various methods, and although it has been suggested that definite orders should be issued as to how pupils should be taught to fly, I have never been able to bring myself to issue such an order for fear of hampering initiative. The qualities required in an instructor are almost precisely the same as the qualities required in a man whose business it is to break in young horses—*infinite patience, great sympathy, good hands, and a clear, steady head.*

The next point which affects requirements of training is the provision of aeroplanes and engines. Here again controversy is eternally raging as to the best types to employ. Before the war the general idea was that a beginner should be taught on the box kite, and this idea has lasted inasmuch that to-day nearly all our pupils start their instruction on a Maurice-Farman. Personally I have been opposed to this system, but I may be wrong and have given way to the majority, but I think from the instructor's point of view the Maurice-Farman is a very nice safe machine on which to get the pupil through his first experience of dual control in the air, although in the actual movements necessary for controlling the machine it is different to almost any other machine in the Service. The 80-Gnome Avro has, beyond the Maurice-Farman, been our standby in advanced training, and is a thoroughly good machine for this purpose, light in handling, comparatively sensitive and not too difficult to fly. For some time pupils were successfully started on 80-Avros, but when Maurice-Farmans are available in sufficient quantities the consensus of opinion has been that it was better to stick to that machine for preliminary training. Now, however, we have a new type, the first of which has just flown, which I hope will eventually eliminate the box kite type of training machine altogether. Another point on which much argument arises is the use of stable machines for training. When stable machines first came in all the old conservative pilots shook their heads sadly and said that you could never make

a good pilot on a stable machine; that idea has died out, but there are still many instructors who insist that to make a good pilot he must first be trained on an unstable machine before being allowed to go on a stable one, to make him careful, but after all *landing* is the great thing, and stable machines are just as hard to land as unstable. Personally I am not at all sure that this is correct, and I believe that a pilot trained on stable machines from the start, after he has had about 30 hours' air experience, will be so confident and have such a good idea of what a machine ought to do in the air, that he will fly an unstable machine without even realising its instability, that is to say, of course, if he has been properly taught. So far as engines go, it is only natural, through the demands of war, that we have been forced to use our obsolete engines for training purposes. As a matter of fact, these obsolete engines are just what are not required for training purposes, because, being of an early type, they are more liable to failure than the modern types, and engine failure is just what one wants to avoid in training. The output of the trade, however, has precluded the manufacture in numbers of a special training engine. But now that the obsolescent engines are of newer types, this difficulty will tend to disappear.

"Now to turn to the actual process of training. I will consider it under two heads, technical training both on the ground and in the air and military training both on the ground and in the air. The first portion of technical training is the care of engines, rigging of aeroplanes, the use of the compass, the use of instruments and other such details. This is carried out at the two schools of military aeronautics; engines are taken down and erected and are run, samples of as many types as possible being provided to give the pupil wide experience. The same applies regarding the rigging and erection of aeroplanes, and pupils are made thoroughly conversant with the use of all the instruments. Thus a pupil before he actually learns to fly really has some knowledge of his engine, his machine, and its instruments. He then goes on to preliminary and advanced training squadrons, and continues to learn the enormous amount there is to learn on these heads by practical experience both in the air and in the squadron shops.

"A very debatable point in the actual training in flying is whether reserve squadrons should train pupils all through—*i.e.*, from the very start up to the time they get their wings—or whether, as is the system at present, they do preliminary training with one reserve squadron and go on to higher training in another. There are certain arguments for and against both systems, but we have adopted the second. The greatest argument in favour of the first system is that the one instructor can take a pupil and really get to know him and follow him right through his training; but practically preliminary training takes a shorter time than advanced training, and the system of military training is simplified by separating preliminary flying training from the advanced flying training. One great advantage of placing preliminary training and advanced training in separate squadrons is that the squadrons can be homogeneous in equipment. So much for the technical training; it is fairly simple, given a sound instructor and good weather.

"I have already explained the many military qualifications demanded from the modern pilot, and the military training on the ground, like the technical, is carried out at the schools of military aeronautics, where the pupil gets a good grounding in the use and care of the machine gun, wireless, artillery observation, photography and bomb-dropping, and this training he completes from practical experience when he gets on flying instruction.

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wonderfully lucky in having the finest material in the world to work on both for instructors and pupils. The Englishman may be conservative, but he is certainly the finest pilot in the world; the value of all the old British characteristics which made us masters of the sea is intensified in the air, and they will make us masters of the air yet, in spite of our politics and our system of government, and all the many obstructions to progress which will assuredly spring up as soon as peace is declared. War has been the making of British aviation, and we must look to it that we preserve and develop the fruits of this war so far as aviation is concerned. Now by technical training in the air I mean instruction in flying pure and simple, without any direct reference to its military uses. During peace a good many pilots learned to fly by the light of nature. They were just put into a machine and made to taxi about on the ground until they knew the controls, and then pushed off into the air, and left to take their chance—a thrilling moment both for themselves and their instructors. Now I think it is fairly well established that dual control is an absolute necessity. It gets the pupil into proper habits in the early stages of his training, and this he cannot really dispense with unless he is a heaven-born genius who takes to the air as a duck does to water, and there are certainly some men who seem to require no training at all.

"The most difficult part of flying is landing.

"The stereotyped method of starting instruction is on a Maurice-Farman, with dual control, up and down 'straights,' gradually giving the pupil more and more control until he lands properly. In fact nearly the whole art of flying lies in landing, and a man who lands well *under any conditions* will certainly be able to do anything else in the air well on his own, given a sound nerve. After the first few solos on an easy type of machine, the pupil usually returns to dual control on a faster and more efficient machine—after many and wearisome circuits and landing with dual control, he is sent off on his first cross-country flight, another really thrilling experience. Before being allowed to do this, however, a pupil should be able to land within a marked chalk circle with his engine stopped from any height, and to have practised landing slowly over obstacles.

"During this period of training one of the great bones of contention used to be the advisability of training a pupil to fly by means of his instruments as opposed to balance. Instruments used to be unreliable. Instruments of late have become more and more reliable, and personally I am the greatest believer in using them for training. After a little experience with instruments, as a guide, any intelligent man will find himself working without them instinctively, and they will have tided him over many dangers in the early stages.

"I have already talked about stability, and I think the day will come when an unstable machine will be looked upon as impossible. Another very interesting point is the value of air experience as a passenger before learning to fly. I used always to be of opinion that a large amount of passenger flying would almost teach a man to fly before he was asked to touch the controls at all, but I have been somewhat disappointed in actual results.

"Well, once the ice is broken by the first few cross-country flights, progress becomes rapid, and the pupil soon begins to really handle his machine in the air, and to practise real aerial gymnastics, such as steep spirals, loops, tail-slides, and so on. Then slowly the air habit begins to grow on the man, if he is ever going to be any good, and experience—and nothing else—makes it possible to land almost anywhere in a bad country with the engines stopped dead, and to drop down faultlessly on to a strange landing-place without any indication of the direction of the wind or the slope of the ground, and to manœuvre round and over storms, and find your way regardless of weather. As the pupil goes on the best form of training is to force him to fly in really bad weather. There is nothing which gives so much confidence as a successful bout with a nasty day. Weather has extraordinarily little real effect on flying so long as it is sufficiently clear to see; fog and very heavy rain are the two really undefeatable factors in aviation. The war has taught us to laugh at weather. It is only four years ago that 'bumps' were looked upon with the deepest reverence and respect, and there were certain crossings over the rivers and hills around Salisbury Plain which were usually avoided except by the boldest. To-day, however, no one ever thinks of them, and yet almost exactly the same machines are being used for preliminary training as were being used then. It is a very good example of the wonderful growth of confidence in the last few years, which has done much to push on the progress of aviation.

"On the whole flying itself is so easy that pupils suffer from over-confidence. Careful teaching is essential, and very careful instructions as to the best method of meeting any emergency, such as a spin or a nose-dive, and it is only quite lately that we have had any authoritative statements as to how to compete with these situations, and even now there are probably people who differ as to the best course to follow if you find yourself nose-diving out of a cloud.

"Anyway, the actual assimilation of the art of flying—or the air-habit—is largely a matter of air experience, and, given nerves and health and common sense, there are very few Englishmen who won't make good pilots so long as they have sufficient experience."

ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS.

New Club House.

The New Club House at 3, Clifford Street, W., is now open to Members.

Luncheon and Dinner are served daily, and Bedrooms are available.

SPECIAL COMMITTEE MEETING.

A Special Meeting of The Committee was held on Friday, the 26th inst., when there were present: Prof. A. K. Huntington, in the Chair; Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Lieut.-Col. Mervyn O'Gorman, C.B., and the Assistant Secretary.

Election of Members.—The following New Members were elected:—

Flight-Lieut. Alfred William Clemson, R.N.
Dr. Ernest Henry Crisp.
Luke Terence Delaney.
Lieut. John Pascoe Elsdon, R.N.V.R.
George England.
Capt. Montagu Henry Somers Fenn.
Major Henry Kenneth Foster, R.E.
Flight Sub-Lieut. Patrick Henry Hepburn, R.E.
Bernard Alexander Isaac.
Lieut. Michael Kudstodieff (Russian Imperial Army).
Lieut. John Duncan Laird (5th Royal Fusiliers).
Flight Sub-Lieut. Philip Sydney John Owen, R.N.
Flight Lieut. Percy Roach-Pierson, R.N.
Lieut. Marcus Thurlow Wright, R.F.C.

Suspension of Entrance Fees of New Service Members.

Until further notice, Service Members will be elected to the Royal Aero Club without Entrance Fee.

Subscriptions.

Members are reminded that the Subscription of £5 5s. for the year 1917 became due on the 1st January last. Bankers' Order Forms can be obtained on application to the Secretary.

Servants' Christmas Fund.

The Subscription List for this Fund is now open.

THE FLYING SERVICES FUND

administered by

THE ROYAL AERO CLUB.

The Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The Fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers, and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 3, Clifford Street, New Bond Street, London, W.

Subscriptions.

	£	s.	d.
Total subscriptions received to Jan. 23rd, 1917	11,122	1	11
Staff and Workers of Gwynnes, Ltd. (Thirty-first contribution)	8	7	11

Total, January 30th, 1917 11,130 9 10

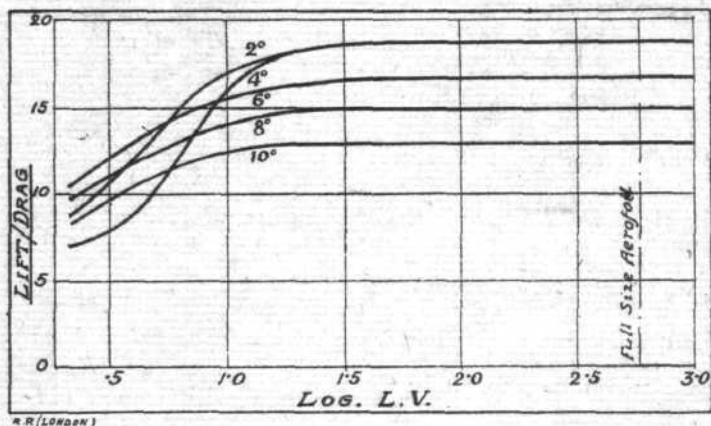
B. STEVENSON, Assistant Secretary.
3, Clifford Street, New Bond Street, W.

ANSWERS TO CORRESPONDENTS.

[As a number of letters reach us signed with initials only some of which do not give a complete address, we would point out that such communications cannot be dealt with in our columns. Full name and address, which will not be published, must always be given.—Ed.]

R. R. (London).

In applying the results of tests on model wing sections to the wings of a full-sized machine, account must be taken of the fact established by experimental research that, whereas the lift coefficient is scarcely affected by changes in size and speed, the same does not apply to the drag coefficient, or, as it is now frequently called, drag coefficient, the word "drift" already having another meaning in connection with the flight of an aeroplane. Experiments at the N.P.L. have shown that the drag or resistance of a wing does not increase with V^2 but at a slightly less rapid rate. The drag coefficient is not, therefore, a constant, but is subject to variation with



speed. This, of course, affects the lift/drag ratio, which will be slightly higher in a full-size machine than that indicated by tests on models. In other words, the full-sized wing will be rather more efficient than the model. In order to determine how lift/drag changes with size and speed (L.V.), experiments were carried out at the N.P.L. on a model of the R.A.F. 6 section, and the results of these experiments are shown in the accompanying graph, the application of which you say you do not quite follow.

In this figure the ordinates are the lift/drift ratios for the R.A.F. 6 section, plotted against log L.V. as abscissa. The reason for choosing log L.V. instead of L.V. itself is purely one of convenience in plotting. L = length of chord in feet, and V = velocity in feet per second. From the graph it will be seen that at the angle corresponding to maximum L./D., the value of L./D. is increased from about 8 for log L.V. = .5 to about 18 for values of log L.V. greater than 1.6. Now, in practice, experiments are rarely made on models so small and at velocities so low as to give a value of .5 to log L.V. For instance, a very usual chord length for models tested in wind tunnels is 3 ins., or 0.25 ft., and velocities of 30 feet/sec. are quite common. Taking these figures for a basis, it will be seen that $L.V. = 0.25 \times 30 = 7.5$, and therefore $\log L.V. = \log 7.5 = 0.88$. Looking at the graph, it will be seen that the difference in the value of L./D. at the angle of maximum L./D., 4°, between log L.D. = 0.88 and a full-size machine of 5 ft. chord flying at 100 ft./sec.—corresponding to log L.D. = 2.69—is from 15 to 18, or an increase in L./D. value of 20 per cent. For other angles the difference is somewhat smaller. In other words, the lift/drag ratio of the full-size wing at the angle of maximum L./D., may be expected to be some 20 per cent. higher than that indicated by the model tests. These experiments, however, cover too narrow a range to make them directly applicable to all sections, since it does not necessarily follow that variations in L./D. ratio with L.D. is the same for all sections. They serve, however, to give an approximate estimate of how much greater the efficiency of the full-size wing may reasonably be expected to be than that found for the model.

B. G. F. (Royal Fusiliers).

An explanation of the problems that are troubling you would be too lengthy for our correspondence column, but you will find them dealt with in the following books: "Aeroplane Design," by F. S. Barnwell, and "The Design of Aeroplanes," by A. W. Judge. Both are obtainable from "FLIGHT" offices. The prices are 2s. 10d. and 9s. 6d. respectively, post free.

C. C. (Widnes).

You are quite right in assuming that the phenomena known as "air pockets" are not "holes in the air" or spaces of rarified air, but are rather to be considered as currents and gusts of various direction. For instance, one may speak of head gusts, rear gusts, up currents, down currents and rotary gusts. The head gust virtually increases momentarily the air speed of a machine, and therefore results in an upward swoop. The up current tends to lift the machine bodily, while, of course, a down current causes it to drop. A rear gust also tends to cause the machine to drop, since it has the effect of decreasing the relative speed of the machine through the surrounding air. Little is at present known regarding rotary gusts, but it is conceivable that a machine entering such a whirl would be affected both by the whirl and by the linear velocity generated by it, and therefore experience a greater disturbance than if it had met a pure head-on gust.

F. P. W. (Coalaston).

(1) The speed required to lift a machine with a loading of $1\frac{1}{2}$ lbs. per square foot depends on the section employed. (2) The thrust required in relation to the weight depends on the "fineness" of the machine. If the gliding angle is 1 in 8 at a certain speed, then the thrust required at that speed is one-eighth of the total weight. (3) The size of spars for a loading of $1\frac{1}{2}$ lbs. per square foot and span and chord of 25 ft. and 3 ft. respectively should be: Depth, as great as wing section will allow; width, about $1\frac{1}{2}$ ins., spindled out to an I section between points where struts are attached to spars. Exact dimensions cannot be given without further particulars of the design.

F. B. (South Ealing).

The outside diameter of the 100 h.p. Gnome single-valve engine is about 38 ins. For methods of mounting rotary engines, see our "Constructional Details" series published in "FLIGHT" during 1916.

E. W. P. (Openshaw).

You should apply to the Admiralty for the necessary form, and, having filled it up, send it to the Director of Air Services, Admiralty, S.W.

G. W. Q. (Purley).

We presume you mean *qualified* for the Royal Aero Club certificate, as it is not issued to anyone under the age of eighteen. It is hardly likely that any school would take an instructor so young.

J. W. (Shipley).

You must first obtain your C.O.'s permission, and, having got that, you should be able to get into the cadet school.

J. J. W. (Brighouse).

Under the circumstances, you appear to be doing more useful work where you are. If you are passed for general service, you would probably not be able to join the R.F.C.

W. A. V. (Southport).

There appears to be no reason why you should not be able to join the R.F.C. Cadet Corps. If passed for general service, you would not be able to enlist in the R.F.C. If you are given a commission, you would be taught at a Government school.

C. T. (Hollinwood).

The fact that at present you have "had no experience with aeroplanes" need not prevent you applying for admission to the R.F.C. Cadet Corps if you are physically fit. You can obtain full particulars from Adastral House, E.C.

Armchair Reflections

by the "Dreamer"

Frank Goodden.

REFLECTIONS are sometimes memories that bring sadness in their train, yet as reflections, sad as they may be, they have their usefulness if only to cause us to appreciate things of the present by contrasting them with things of the past to which we, at the time, paid but little notice.

Not always do I sit down to write this page in lighter vein. It has fallen to me, unfortunately, on some quite few occasions to have to reflect on the passing of one from our midst, and from our friendship, for in this big world of aviation as we see it to-day there is another and smaller world, the world composed of all those early investigators into the then elusive art of flying, which world must of necessity be composed of personal friends.

Therefore I may perhaps find excuse if the personal note should appear, and run through this sad business of mine in writing a few words about one who, known to everybody as the best of good fellows, yet had those among his many friends who were, perhaps, in closer personal touch with him, and could claim that nearer friendship so easily understood, but so hard to define.

In heading this little tribute to him, I have called him Frank Goodden and not Major Goodden, and in this, could he but know of it, I have done as he would have wished, for Frank Goodden was Frank Goodden always and every day in the week. Known to everybody in the early days as Frank, no promotion could ever alter his simple nature, and Frank he would have remained to the last, even should his hand ever have grasped the Field-Marshal's baton. He would have wished nothing different, and would have felt annoyed had his rank allowed any strained relations to come between himself and the friends of other days.

In claiming him as something nearer than even that which is known as a personal friend, I use in justification the fact that I knew Frank long before he ever had anything to do with aviation. The picture that rises before me as being the first occasion on which I saw him is that of two youths tinkering about in a country road with an old twin-cylinder motor-bike, one of whom was Frank and the other my own son, who were both apprenticed to the same firm of electrical engineers. From this first acquaintance, I followed his career, and had the honour (in this case not an empty word) of his friendship right down to the Friday evening before his death on Sunday, when, his guest at Pinehurst Grange, Farnborough, he drove me to the station in his car to catch the 10.2 p.m. train to town.

How lightly I parted with him then, with the briefest of handshakes and the murmuring of thanks for his hospitality. I had withstood his importunate pressing that I should stay the night with him, for such was his good nature that I am sure it was a pang to him to allow any of his friends to depart. I left him there in his car, turning away from the station for his homeward journey with a wave of his hand, never dreaming that that was the last I should ever see of a very dear friend, and one whom everybody loved, and one who I firmly believe had never

an enemy in the whole world. Of his career in aviation I need say but little, for it is well known to those who knew him at all, as was, indeed, his personal character, yet I cannot let him pass away from us for all time without touching a little on both.

I really think Frank's first ambition to become an air pilot was brought about by watching the attempts of A. V. Roe to fly his early triplane "Bullseye" on Lea Marshes, where we used to go on Sundays to follow his manoeuvres, and shout praise at his extended "hops."

This period was followed by his entry into ballooning and into the performing at public gatherings the then rather fearsome feat of the parachute descent. Fear of the air, as applied to high altitudes, I think Frank never knew, whether it was as a balloonist, a parachutist or as the pilot of an aeroplane. A few thousand feet drop in a parachute was all in the day's work to him, as witness once at Hendon, when Mr. Newall, the parachutist, went up sitting on the chassis strut of the Grahame-White five-seater, in order to entertain the public with an exhibition of his skill. Goodden was a passenger, and when he thought sufficient height had been attained, because Newall did not leave just when he (Frank) thought he ought to, he calmly walked out on the lower wing and pushed him off with his foot. His earlier association with aeroplanes was at Oxford, where he also built his own machine, which was as soon as finished destroyed by a gale which demolished the sheds, or by fire, I forget which. Then came his association with Willows, and his trip to France with him in the Willows airship. Next came his appearance at Hendon as a pilot in the Ewen School, followed by a short term with the Grahame-White Co. in the racing season. Later he acquired, in conjunction with Etches, of the Bournemouth Aviation Co., Gustav Hamel's Morane monoplane, on which he gave looping demonstrations throughout the country, and on the outbreak of war his work was invaluable, at first as a civilian, and later as a commissioned officer, as test pilot at Government flying stations.

And from this last national work he has passed from us, one of the best fellows that ever lived and one of the most steadfast friends man ever had. The accident appears to have been caused by a wing breaking at 12,000 feet, and, game to the last, Goodden made valiant efforts to right his machine, but without succeeding. I had expected a letter from him this morning in connection with some private matters; instead, I read the account of his accident and death in my morning paper. So close are we to death that we think we are always prepared, yet when the time comes for one of our friends to pass to the Great Beyond the shock of it still strikes home with a sledge-hammer blow. Then, and only then, do we really realise how dear the lost one has been to us, and then, and only then, do we determine to make the most of those that are left, but it appears to be beyond the power of man to know the value of anything until the object has passed beyond his touch for all time.

Poor Goodden!

AIRISMS FROM THE FOUR WINDS.

By way of a start the Society of British Aircraft Constructors have good reason to be satisfied with their usefulness. The generous collection without fuss from amongst its members of £6,785 towards the two Service Funds for providing winter comforts to those away out yonder is a pretty good earnest of the hand the Society is likely to take in any matters of concern to the aeronautical world. Note the names of the individual donors to this list, which we publish elsewhere in "FLIGHT."

It is being asked day by day in wider circles whether it is not time a re-organisation of our light-suppressing arrangements were seriously considered. The whole question is only a matter of degree, and there is no doubt that the present stage of inky-darkness is about as bad as it well may be. By the increase of the light to double its present power little harm could arise under the system of advice in advance of the approach of air raiders to these coasts. It would then be ample time to reduce all light power to its present vanishing point if thought advisable, and as even twice the present light could hardly be deemed a glare to even the most keen-eyed, there would be very little danger of trouble amongst the public when they suddenly found the light back to its real Zepp. stage. Moreover, this fact alone would be warning sufficient for most wise folk to keep within their four walls. This latter may, however, be, in the opinion of those who decree what is to be, the rock against which anything of the sort will wreck itself. Therefore we must probably be content to go on having our populace gradually killed off by bewildered drivers in the streets.

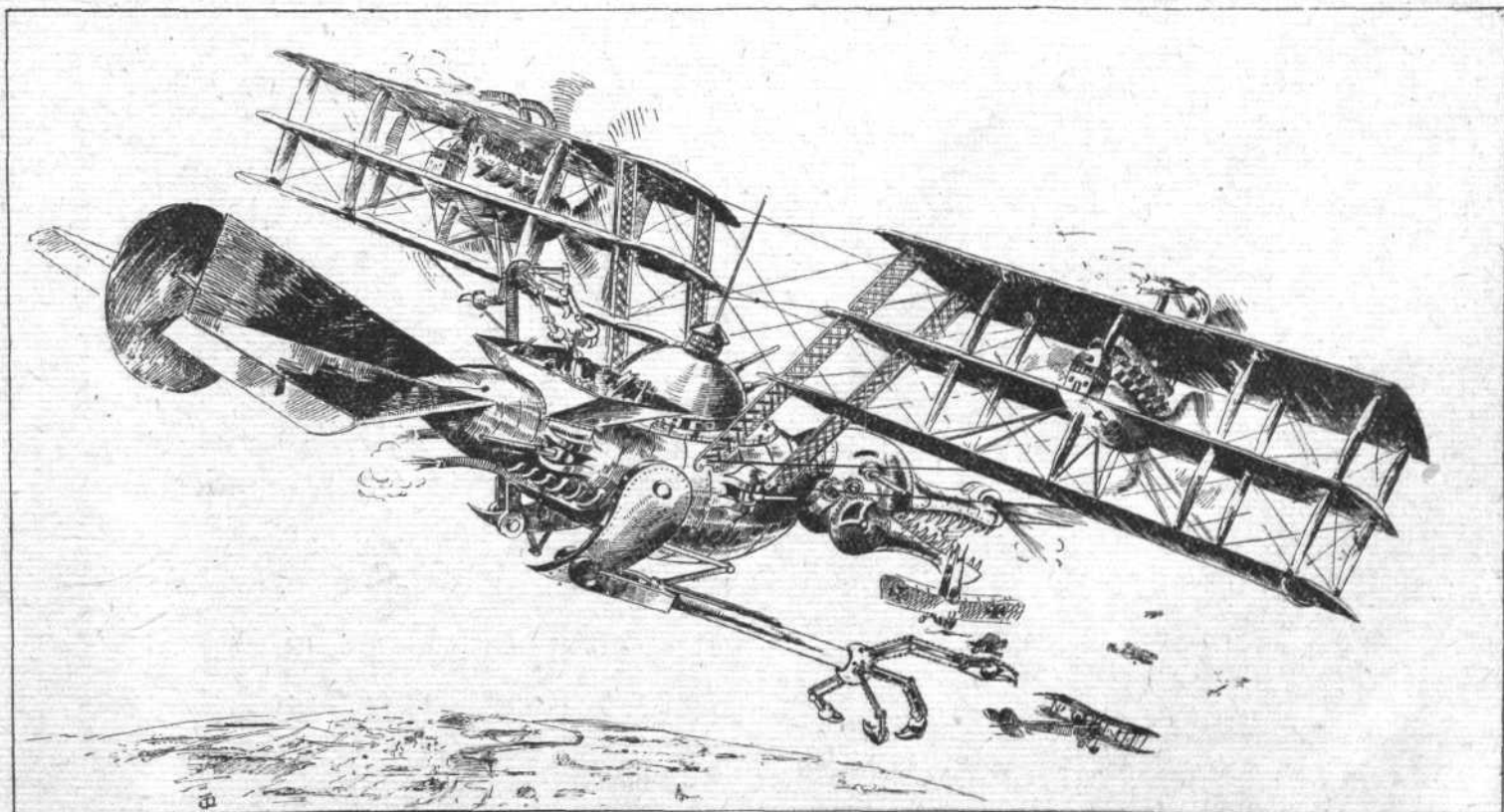
MR. INGLEBY ODDIE, the Lambeth Coroner, took occasion to emphasise the whole subject last week, at an inquest on the body of a man who was killed by a R.F.C. motor car, Mr. Oddie suggesting that the lighting regulations had been carried too far. Every one, he said, would appreciate the necessity of darkening our streets at times when raids were likely, but he had never heard of Zeppelins arriving at 5, 6, 7, 8, or even 9 o'clock in the evening. People leaving work

and returning home had to catch their trams and omnibuses or walk about at a time when the streets were extraordinarily dangerous, and it was a question whether the time had not come when the lights should be turned up, at any rate until 9.30. The people who made the regulations perhaps did not usually travel by trams and omnibuses, and so did not realise what a terrible state of things existed in London just now in "crush hours" at night.

ALL of which sounds like sound common sense. Moreover, Mr. Oddie further strengthened his views by the statement of a few facts. Accidents, he affirmed, due to the darkened streets were now so common that the newspapers did not report them. He had been looking up the statistics of his own district, and the result was very striking. In October, November and December, 1913, there were 17 inquests due to street accidents. In the same months in 1916 there were 47. There were eight London coroners, and if those figures were multiplied accordingly it would be found that a terrible state of affairs existed during the hours of darkness.

ONE of the early visitors to Lady Drogheda's Aeronautical Exhibition at the Grosvenor Gallery was Prince John, and other much interested visitors last week included King Manoel, Princess Louise of Battenberg, the Duchess of Rutland, Countess Torby and Countess Zia Torby, Lord and Lady Tredegar, Lord Alington, Lord Harcourt, &c.

It was pleasing to hear General Brancker on the opening day of the Show in his own inimitable and incisive way drawing attention to the extraordinary and almost alarming progress—that was how he put it—of aviation in the last few years. Although fighting in the air had been clearly predicted many years ago, those who talked about it just before the war were regarded as ill-balanced enthusiasts. The future prosperity of England, General Brancker claimed, would depend on aviation, which was one of the greatest guarantees of peace in the future. There was no doubt at all that our pilots were the best in the world. But casualties



THE AERIAL "TANK" OF THE FUTURE—By an inventor who should be interned.



The late Major F. W. Goodden, R.F.C., who was killed on Sunday whilst flying.

were increasing, and he commended to the public this exhibition, which was inaugurated to help the relatives of those who were killed or disabled while doing their duty in the air.

ONE and all, therefore, should make it their business to contribute their shilling entrance money to this Fund, and at the same time get more than full value for their expenditure.

REMINDERS to wish the Kaiser many unhappy returns of his birthday were freely sold on Saturday last in an Essex town in the form of relics from a Zeppelin brought down in the neighbourhood last September. And the proceeds helped to swell a little bit more funds of that merciful association, the Red Cross Society.

"No mention is made of 'freedom of the air' in President Wilson's 'peace proposals.' Is this to be maintained? And if so, how? If not, why?"

So writes Mr. J. H. Overton, of Woodstock, Oxon. Echo answers: "Why?"

PERHAPS Mr. James M. Beck, a fellow citizen of Wilson, and a former Attorney-General of the U.S., may know something upon the subject. When speaking at the Pilgrims' Banquet in New York last week, this is how he expressed his views upon the too-proud Wilson's peaceful projects:—

"If the Allies are conquered, as I do not believe they will be, then woe betide America. If Germany is conquered, as I hope to God she will be, then the most America can hope for is that the brave peoples who have fought and bled and died for the ideals in which we have as vital a stake as they may understand that Mr. Wilson's unvictorious peace does not represent the American people's views or sympathies."

CONGRATULATIONS to Lord Montagu of Beaulieu upon his safe arrival this time in India. Evidently he has lost none of his enthusiasm for the future of aviation, judging by his

lecture upon the subject in Delhi on Friday last week. In Lord Montagu's opinion mails and passengers between India and England will in ten years' time be conveyed by air. He estimates that the distance to be covered would be from 3,600 to 5,220 miles, according to route, and that the time taken would be from three to five days.

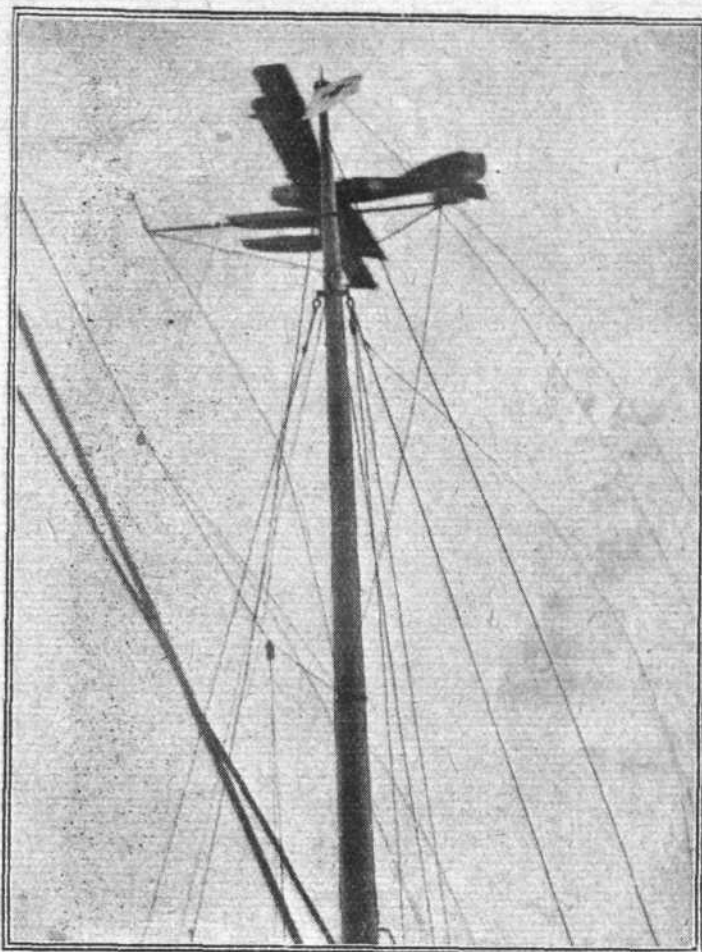
WE are a something of a prophet ourselves, but we're not a bit jealous of being thus blanketed of a little of our wind. Phew, it does blow a bit hot occasionally in India.

HENDON District Aircraft Committee was one of the representative workers' bodies which attended a very big important conference at the Memorial Hall last Saturday to protest against the Government's new railway ninepence for sixpence ramp.

WHAT would happen, we wonder, if the whole of the "rampees" were to agree to stay away from their respective occupations by way of protest for the infliction of what on the surface appears to be about the meanest sort of penalisation of workers bureaucracy has so far perpetrated?



A charming silver Trophy which has just been presented to Flight-Commander Captain L. F. Forbes by the Directors and employees of the Aston Chain and Hook Co., Ltd., of Birmingham, with whom Captain Forbes was associated prior to his joining up with the Air Services. The inscription on the plaque records the admiration of his plucky and skilful pilotship whilst returning from the German lines in September last.



A MISS IS AS GOOD AS A MILE.—Curious camera effect of a seaplane passing beyond the masthead of a ship.

CONGRATULATIONS to Major-General (temporary Lieutenant-General) Sir D. Henderson, K.C.B., D.S.O., who, in the list of honours and rewards for valuable services rendered in connection with the war, has been appointed lieutenant-general, and to Major and Brevet-Lieutenant-Colonel (temporary Brigadier-General) W. S. Brancker, R.A., who is appointed Brevet-Colonel.

A NEW régime for the French flying services is to have a trial. General Lyautey, Minister of War, has decided to create a central organisation to deal with the aviation supply service, the whole to be grouped under one central authority in Paris, controlled by the Minister himself. General Guillemin has been selected for this important post.

Hitherto the aeronautic services within and without the war zone have been kept separate, with the inevitable result of loss of cohesion, the respective chiefs frequently standing for contradictory schools and methods. General Guillemin is to have at his disposal civilian as well as military expert advice.

THE ROLL OF HONOUR.

REPORTED by the Admiralty:—

Accidentally Injured.

Flight Sub-Lieut. R. M. Hughes, R.N.
Actg. Flight-Lieut. S. J. Woolley, R.N.

Seriously Injured.

Lieut. A. H. M. Haggard, R.N.
Flight Sub-Lieut. M. H. Stephens, R.N.

Injured.

Prob. Flight Sub-Lieut. H. A. Mitchell, R.N.
Flight Sub-Lieut. A. B. Shearer, R.N.

Slightly Injured.

Flight-Lieut. R. Young, R.N.

Reported by the War Office:—

Killed.

2nd Lieut. A. H. Hodgson, R.F.C.
2nd Lieut. W. Kellett, Somerset L.I., attd. R.F.C.
2nd Lieut. S. W. Woodley, R.F.C.
15792 1st Air-Mech. A. A. Stooke, R.F.C.

NOTHING like good example. Therefore is King George to be admired for turning out his pockets and depositing, with presumably some trustworthy person, his treasures in the shape of smoking material and metal, including even his spurs, when entering the danger zone of a munition factory last week. Why every offender in this connection, with matches, &c., on their persons is not summarily condemned to a minimum of six months' hard labour without the option of a fine is beyond the understanding of the uninitiated. A start has certainly been made in the right direction to suppress these congenital idiots—criminals is nearer the mark—and there is promise of more to follow, as the chairman of a Midland police court said the other day that much more drastic terms of imprisonment would be given in future cases brought before him. It was a gruesome simile the magistrate drew when he pointed out that thousands of men equally careless and unaccustomed to discipline were in places in France where they were forbidden to put their heads above the ground, and the penalty for contravening that was often instant death.

ADMIRERS of the work of Mr. (now Lieutenant) Muirhead Bone should take an opportunity of visiting the exhibition of his drawings, made on the Western Front, which is now being held at Messrs. Colnaghi and Obach's galleries in New Bond Street. Typical examples of different phases of Lieutenant Bone's art are "A Wrecked Aeroplane near Albert" and "A Mess of the Royal Flying Corps."

IN the latest lists of honours will be noticed the names of Major-General R. M. Ruck, C.B., Chairman of the Aeronautical Society, and Colonel and Hon. Brigadier-General F. G. Stone, both of whom have been given a C.M.G. in recognition of valuable services in connection with the war, and have also been mentioned in despatches for distinguished services.

DR. DUGALD CLERK, F.R.S., has been elected a Fellow of the Aeronautical Society.

THE Dutch aviation paper *Avia* has been abandoned and the new official organ of the Royal Dutch Aero Club is named *Het Vliegkamp* (*The Flying Ground*), the first number being due about now. This will now constitute the only aeronautical journal in Holland, the two previously existing being combined in this one publication.

TEN YEARS AGO.

Excerpts from the "Auto," ("FLIGHT's" precursor and sister journal) of January, 1907. "FLIGHT" was founded in 1908.

THE DE LA VAULX AIRSHIP.

The de la Vaulx airship on Monday last made further ascents with, what we may now term, its customary success. At 1 o'clock she was got ready for a start. The excursion lasted 10 minutes, a height of 120 metres being attained. The airship, the propeller of which was revolving at 550 r.p.m., made a speed of 13½ m.p.h. against a wind which was blowing at 9 m.p.h., with occasional gusts attaining to a speed of 13½ m.p.h.

At 4 o'clock the airship made a successful 20 mins. flight. Seventy kilogrammes of ballast were, as usual, carried, which was noteworthy, as the balloon has now been inflated for no less than 30 days. In these last flights the silk-covered propeller which has been used from the start was retained, although the silk was again stretched tight; but this propeller is being replaced by a wooden one, which Count de la Vaulx anticipates will give a much better effect.

Previously reported Missing, now reported Killed.

Capt. L. S. Charles, Worcestershire and R.F.C.

Died of Wounds.

2nd Lieut. F. R. White, R.E., attd. R.F.C.

Died.

5720 2nd Air-Mech. H. Doran, R.F.C.
24056 2nd Air-Mech. G. A. Nicholson, R.F.C.

Wounded.

Capt. C. E. W. Foster, R.F.C.
9279 Corpl. A. O. Bower, R.F.C.

Previously reported Missing, now reported Wounded and Prisoner of War in German hands.

2nd Lieut. I. Curlewis, M.C., R.F.C.

Previously reported Prisoners of War, now reported Wounded and Prisoners of War in German hands.

Lieut. A. Anderson, Connaught R., attd. R.F.C.
2nd Lieut. H. F. Evans, R.H.A. and R.F.C.
2nd Lieut. W. E. Knowlden, Border, attd. R.F.C.

PERSONALS

Under the above heading will be published weekly particulars of a personal character relating to those who have fallen or have been wounded in the country's service, announcements of marriage and other items concerning members of the Flying Services and others well known in the world of aviation. We shall be pleased to receive for publication properly authenticated particulars suitable for this column.

Casualties.

Lieutenant HENRY RATHBONE HELE-SHAW, R.F.C., previously reported missing on July 19th last, now unofficially reported shot down in aerial action with his machine and killed, aged 20 years, was the only son of Dr. and Mrs. Hele-Shaw, of Coleherne Court, S.W. He was educated at Sandroyd Preparatory School and at Marlborough. When war broke out he had just taken an open scholarship at Clare College, Cambridge, but he immediately enlisted in the Public Schools Brigade and obtained a commission shortly afterwards in the R.G.A. A year later he obtained his pilot's certificate and was gazetted to the R.F.C. He acted as a ferry pilot through last winter, and was then selected for a squadron, with which he went to the Front. After some weeks of fighting he was reported wounded. On his recovery he flew again, and almost immediately after, during an engagement in which the flight had difficulty in keeping together because of the clouds, his machine disappeared and was not seen again.

Second Lieutenant A. H. HODGSON, R.F.C., reported killed, was an old Foundation scholar of the Manchester Grammar School, who passed his senior school certificate in 1913 and won a Langworthy scholarship in 1914. He was football captain and vice-captain of the school.

Second Lieutenant WILLIAM KELLETT, Somerset Light Infantry, attached R.F.C., reported killed, was the brother of Mrs. Cecil Rayner, Richmond Mount, Headingley, Leeds. He joined the Hussars at the outbreak of war, and later obtained a commission in the Somerset Light Infantry, with which regiment he saw much fighting. A few months ago he was transferred to the Royal Flying Corps as an Observer. Second Lieutenant Kellett was recently mentioned in Despatches.

Second Lieutenant ERNEST WYNN, R.F.C., who has died in hospital, was a son of Mr. A. E. Wynn, of Rathgowry, Harrogate. His machine was brought down in the enemy lines on November 1st, after which he was reported missing. A War Official message states that, according to a German report, he died in hospital the same day. He was 20 years of age, and formerly a student at the University of Leeds.

Major F. W. GOODDEN, R.F.C., who was killed while flying on January 28th, aged 27, was the second son of Mr. and Mrs. H. F. Goodden, of Eastbourne, and was one of the youngest majors in the Flying Service. Less than two years ago he obtained his commission as second lieutenant. He was soon promoted captain, and a few months later obtained his majority. He was an intrepid airman, and is said to be the first to loop the loop at night. He was recognised as one of the best British pilots, and was specially congratulated by the King on more than one occasion.

Flight-Lieutenant ROLLO VAVASOUR, R.F.C., who died in hospital in London on January 16th, was the second son of Mr. Henry Vavasour, Blenheim, New Zealand. A member of one of our oldest English Roman Catholic families, he was educated at the Jesuit College, Sydney, N.S.W. On the outbreak of the war he endeavoured to obtain a commission in the New Zealand Expeditionary Force, but was unsuccessful. He paid his own passage to England, and was eventually gazetted to the Royal Artillery in May, 1915. After some months' training he was transferred to the R.F.C., and became a pilot in November of the same year. Early in 1916 he proceeded to the Front with his squadron, and was at once recognised as a daring and resourceful pilot. On one occasion when at an altitude of 10,000 ft. he was attacked by a Fokker, and a bullet passed between his legs, perforating the lubricating oil tank, but by cool and skilful handling of his

machine he was able to land safely inside the British lines. On another occasion he had a prolonged encounter with a Fokker, and succeeded in bringing his antagonist to the ground. Ultimately his health gave way, and he was invalided home in the late autumn of 1916. After recuperating he was appointed Flight-Instructor at an important training centre for pilots, but his health again broke down, and he was operated upon for appendicitis. The funeral took place at the Catholic Cemetery, West Brompton, with military honours.

Missing.

Flight Sub-Lieutenant WARNER H. PEBERDY, R.N., son of Mr. W. W. Peberdy, of Rugby, is reported by the Admiralty as having failed to return from a scouting flight from Thaso Island on the 14th inst. He was educated at Rugby Lower School, and gave up a responsible position in America to join the Forces. Sub-Lieutenant Peberdy was 34 years of age.

Wounded and Prisoners of War.

Second Lieutenant IVAN CURLEWIS, M.C., R.F.C., formerly posted as missing, is now reported wounded and a prisoner in German hands. His award of the Military Cross was gazetted last November: "For conspicuous gallantry in action. He attacked an enemy machine, which he drove off. Later he destroyed an enemy machine and brought down a balloon under very heavy fire, displaying great courage and determination throughout."

News has reached the relatives of Flight-Commander EDWIN ROLLAND MOON, of Southampton, whose death was recently officially announced, that he is a prisoner in the hands of the enemy.

Married and to be Married.

The engagement is announced between Captain GEORGE HORNBY BIRLEY, R.F.C., younger son of the late Mr. Francis Hornby Birley and of Mrs. Birley, and MARY, daughter of Mr. RICHARD WILLIAM KNIGHT, of Buckminster, Leicestershire.

Second Lieutenant WILLIAM ARTHUR BOND, M.C., K.O.Y.L.I., attached R.F.C., eldest son of Mr. and Mrs. Arthur Bond, Chesterfield, was on January 23rd married to AIMÉE CONSTANCE, younger daughter of the late Wm. ARNOTT McHARDY and Mrs. Weller, 240, Oxford Street, W.

The marriage arranged between Major T. E. St. CLARE DANIELL, R.F.C., son of Mr. and Mrs. R. T. Daniell, of Cheltenham, and BRENDA, younger daughter of Mr. and Mrs. F. J. OAKLEY, of Sutton Lodge, Oatlands Park, Weybridge, will take place on February 10th at St. Mary's Church, Oatlands Park, at 2.30.

A marriage will take place on February 15th between Second Lieutenant LIONEL CHARLES HAWTREY HICKS, R.F.C., youngest son of Captain John Hicks, R.N., of The Moorings, Sevenoaks, and The Oaks, Halifax, Nova Scotia, and LILY FRANCES LAW BAKER, fourth daughter of the late John Baker, Azul, Argentine, and Mrs. Jessie Baker, Temperley, Buenos Aires.

The marriage arranged between Flight Sub-Lieutenant KEITH ROSS MUNROE, R.N.A.S., son of Mr. and Mrs. William Ross Munroe, of Boombah St. George, Queensland, Australia, and ETHEL NELLIE STYLES, daughter of Mr. and Mrs. W. G. Styles, of 19, St. John's Wood Park, N.W., took place on January 26th at All Saints' Church, Finchley Road.

Items.

The will of Flight Commander GEORGE HENRY BEARD, D.S.C., R.N.A.S., of Dunmow, whose body was found September 23rd at sea, has been sworn at £167.

The will of Captain DAWICK MOBERLY VEITCH VEITCH, Indian Cavalry, attached R.F.C., killed in France July 8th, has been proved at £10,715.

The British Air Service

"PER ARDUA AD ASTRA"

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, it is not repeated in this column.

Royal Naval Air Service.

Admiralty, January 23rd.

Petty Officer Mech. R. C. Crawley, Aircraftsman (2nd grade), C. G. Adlington and Leading Mech. R. E. Ollerenshaw granted temp. commissions as Sub-Lieuts., R.N.V.R., and appointed to "President," additional, for R.N.A.S., all date Jan. 20th.

Admiralty, January 26th.

The following entered as Prob. Flight Officers for temp. service, all date Jan. 28th: W. W. Scott, Leading Seaman H. J. Newberry, and Messrs. H. Day, R. A. Nicholson, R. F. C. Metcalfe, P. M. Dennett, C. P. Brown, M. N. Baron, D. I. B. Rock, R. C. Packe, G. N. Trace, J. N. Fisher, F. W. Dalrymple and Ord. Seaman (R.N.V.R.) T. D. Manning.

Carpr. (R.N.) T. C. Head graded as Warrant Officer, 2nd grade, R.N.A.S., to date Jan. 23rd.

Admiralty, January 27th.

Actg. Flight-Com. J. Bird promoted to Flight-Com., with seniority Dec. 31st.

Temp. Sub-Lieut. (R.N.V.R.) B. Grant promoted to Temp. Lieut., with seniority Jan. 25th.

The following have been entered as Prob. Flight Officers for temp. service, and appointed to the "President," additional, for R.N.A.S., to date as stated: Mr. R. D. Smith, Feb. 1st; Asst. Paymrs. (R.N.R.) S. J. Read, Jan. 26th; W. R. Tapper, B. R. Carter and J. W. D. Cripps, Jan. 25th.

Royal Flying Corps (Military Wing).

London Gazette, January 23rd.

Flying Officers.—Jan. 2nd, 1917: Lieut. R. C. Gill, R.A., from a Flying Officer (Obs.), with seniority from Oct. 21st, 1915. 2nd Lieut. G. P. Jamieson, S. Wales Bord., S.R., and to be sec'd.; Lieut. R. P. Baker, 11th Canadian Mtd. Rif.; Jan. 3rd, 1917. Jan. 4th, 1917: Temp. 2nd Lieut. (on prob.) T. C. Luke, R.E.; 2nd Lieut. J. S. Stubbs, S. Lan. R., S.R., from Temp. Lieut., Garr. Bn., L'pool. R., and to remain sec'd.; 2nd Lieut. E. W. Kirby, Hamps. R. (T.F.); Temp. 2nd Lieut. C. H. Dixie, Gen. List; Temp. 2nd Lieut. L. R. Neville, Gen. List. Jan. 5th, 1917: Temp. 2nd Lieut. H. Wilcox, attd. E. Kent R.; 2nd Lieut. (on prob.) J. G. Aronson, R. Lanc. R., S.R., and to be sec'd.; Temp. 2nd Lieut. D. R. G. Mackay, attd. Arg. and Suth'd. Highrs.; Temp. Capt. P. N. Logan, attd. Glouc. R.; 2nd Lieut. (Temp. Lieut.) L. F. Beynon, Mon. R. (T.F.). Jan. 6th, 1917: 2nd Lieut. (Temp. Lieut.) C. H. March, Welsh Brig., R.F.A. (T.F.); Lieut. H. D. O'Neill, R. Dub. Fus., S.R., and to be sec'd.; Temp. 2nd Lieut. W. Bruce, attd. L'pool. R.; Temp. 2nd Lieut. G. A. Hyde, M.C., K. R. Rif. C., and to be transfd. to Gen. List; Temp. 2nd Lieut. A. I. Gilson, Gen. List. Jan. 7th, 1917: Temp. Lieut. A. E. Charlwood, R. Suss. R., and to be transfd. to Gen. List; 2nd Lieut. L. M. Mansbridge, Dorset R., and to be sec'd.

Equipment Officers, 1st Class.—From the 2nd Class, and to be Temp. Cpts. whilst so employed:—Jan. 1st, 1917: Temp. Lieut. A. K. Hall, Gen. List; Temp. Lieut. A. S. Morris, Gen. List.

3rd Class.—Temp. Lieut. R. Cadman, Gen. List, from a Flying Officer; Sept. 7th. Temp. 2nd Lieut. (on prob.) C. J. Brockbank, Gen. List; Jan. 8th, 1917.

Memorandum.—Pte. J. A. Woods, from A.S.C., to be Temp. 2nd Lieut. (on prob.), for duty with R.F.C.; Jan. 15th, 1917.

Supplementary to Regular Corps.—2nd Lieut. (on prob.) F. O'Keeffe resigns his commission; Jan. 24th, 1917.

London Gazette Supplement, January 24th.

The following to be 2nd Lieuts. for service in the field:—
For duty with R.F.C.—Sergt.-Major G. Felstead, from R.F.C.; Dec. 19th. Jan. 1st, 1917: Flight-Sergt. J. Noakes, from R.F.C.; Flight-Sergt. J. B. McCudden, from R.F.C.

The following to be Temp. 2nd Lieuts. (on prob.):—
For duty with R.F.C.—Corpl. E. H. Baker, from A.S.C.; Dec. 26th. Corpl. L. W. Middleton, from R.E.; Dec. 29th. Sergt. H. A. Croft, from A.S.C.; Dec. 30th.

Adjutant.—2nd Lieut. M. W. Bovill, S.R., from a Balloon Officer, and to be Temp. Lieut. whilst so employed; Dec. 5th.

Squadron Commanders.—From Flight-Coms., and to be Temp. Majors whilst so employed: Lieut. (Temp. Capt.)

W. H. Primrose, Arg. and Suthd. Highrs. (T.F.); Jan. 6th, 1917. Capt. A. A. Walser, M.C., Lond. R. (T.F.); Jan. 7th, 1917.

Flight-Commanders.—Capt. C. H. B. Blount, M.C., R.W. Surr. R., from a Flying Officer; Nov. 7th. From Flying Officers, and to be Temp. Cpts. whilst so employed: 2nd Lieut. H. G. Corby, R. Muns. Fus.; Jan. 1st, 1917. 2nd Lieut. W. L. Scandrett, S.R.; Jan. 2nd, 1917. 2nd Lieut. D. C. Miller, Unattd. List (T.F.); Jan. 3rd, 1917. 2nd Lieut. F. E. Sargood, S.R.; Jan. 6th, 1917. 2nd Lieut. (Temp. Lieut.) W. H. A. Whitworth, Dorset R. (T.F.); Jan. 7th, 1917. 2nd Lieut. (Temp. Lieut.) T. Q. Studd, Devon. R., S.R.; Jan. 8th, 1917. Temp. 2nd Lieut. (Temp. Lieut.) H. T. Shaw, Gen. List; Jan. 9th, 1917. Temp. 2nd Lieut. K. M. St. C. G. Leask, Gen. List; Jan. 10th, 1917.

Flying Officer.—Capt. G. H. B. McCall, S.R., reverts from Flight-Com. to Flying Officer; Jan. 25th, 1917.

Equipment Officers, 2nd Class.—From the 3rd Class, and to be Temp. Lieuts. whilst so employed: 2nd Lieut. J. V. Read, S.R.; Jan. 1st, 1917. 2nd Lieut. C. M. Denny, S.R.; Jan. 8th, 1917. Lieut. P. P. Eckersley, S.R., from the 3rd Class; Jan. 10th, 1917.

3rd Class.—Temp. 2nd Lieut. W. E. Smith, Gen. List; Dec. 13th.

Supplementary to Regular Corps.—2nd Lieut. (on prob.) F. G. Reid relinquishes his commission on account of ill-health; Jan. 25th, 1917. 2nd Lieut. (on prob.) P. A. Symmons resigns his commission; Jan. 25th, 1917. 2nd Lieut. (on prob.) A. L. W. R. Henry-Waetjen relinquishes his commission on account of ill-health; Jan. 25th, 1917. The undermentioned 2nd Lieuts. (on prob.) are confirmed in their rank: F. C. Berkeley, E. Brown, G. Barnett. The undermentioned to be 2nd Lieuts. (on prob.): R. E. Taylor; Nov. 17th. F. M. Harding; Jan. 8th, 1917. Jan. 12th, 1917: F. C. Pratt, L. R. J. Williams, F. B. Nicol, F. A. Roberts, A. H. Peake-Jones, A. S. G. Smith, P. F. Antelme.

London Gazette Supplement, January 25th.

Equipment Officer, 3rd Class.—Temp. 2nd Lieut. H. A. Maynard, Gen. List; Nov. 22nd.

Memorandum.—A. A. N. Pentland to be Temp. 2nd Lieut. for duty with R.F.C.; Jan. 26th, 1917.

Supplementary to Regular Corps.—2nd Lieut. (on prob.) G. P. C. Willeby resigns his commission; Jan. 26th, 1917.

London Gazette, January 26th.

Squadron Commanders.—The appointments of the undermentioned are antedated as follows:—To June 1st: 2nd Lieut. (Temp. Major) R. G. Blomfield, 5th Dn. Gds.; Capt. (Temp. Major) Lord G. Wellesley, M.C., G. Gds.; Capt. (Temp. Major) R. E. Lewis, W.I.R.; Lieut. (Temp. Major) A. A. B. Thomson, M.C., R. War. R.; Capt. (Temp. Major) E. P. Graves, R.A.; Temp. Major C. S. Wynne-Eyton, Gen. List. To June 12th: Lieut. (Temp. Major) J. E. A. Baldwin, 8th Hrs.; Capt. (Temp. Major) F. W. Smith, S. Mid. Brig., R.F.A. (T.F.); Capt. (Temp. Major) M. G. Christie, M.C., S.R.; Lieut. (Temp. Major) L. A. Pattinson, M.C., R. Fus.; Temp. Major E. D. Horsfall, M.C., Gen. List. To July 1st: Capt. (Temp. Major) H. F. Glanville, W.I.R.; Lieut. (Temp. Major) W. S. Douglas, M.C., R.F.A., S.R. To July 15th: Capt. (Temp. Major) J. A. Cunningham, R.A.; Lieut. (Temp. Major) L. W. Learmount, M.C., S.R.; Capt. (Temp. Major) C. T. Maclean, M.C., R. Sc. Fus.; 2nd Lieut. (Temp. Maj.) B. C. McEwen, M.C., S.R.; Capt. (Temp. Major) E. L. M. L. Gower, S.R. Capt. (Temp. Major) H. Wyllie, Wilts. R., to July 18th. Capt. (Temp. Major) P. E. L. Gethin, S.R., to July 22nd. To Aug. 1st: Capt. (Temp. Major) B. F. Moore, R. War. R.; Lieut. (Temp. Major) G. L. P. Henderson, M.C., S.R.; Temp. Major B. P. Greenwood, Gen. List. Capt. (Temp. Major) A. K. H. O'Brien, 2nd Dn. Gds., S.R., to Sept. 10th. To Sept. 15th: Capt. (Temp. Major) the Hon. J. L. E. Twisleton-Wykeham Fiennes, Oxf. and Bucks, L.I.; Lieut. (Temp. Major) J. P. C. Cooper, M.C., S.R.; Lieut. (Temp. Major) W. B. Hargrave, Suff. R. (T.F.), to Sept. 16th. Capt. (Temp. Major) H. Petre, M.C., Australian Imperial Forces, to Sept. 23rd. Capt. (Temp. Major) A. H. Morton, R.A., to Oct. 1st. Capt. (Temp. Major) E. M. Murray, M.C. Queen Victoria's Own Corps of Guides, Ind. Army, to

Oct. 4th. Temp. Lieut. (Temp. Major) J. G. Swart, M.C., R.A., to Oct. 7th. Capt. (Temp. Major) W. Milne, M.C., N. Lan. R., to Nov. 1st.

Flight-Commander.—Capt. R. H. Freeman, Worc. R., S.R., from a Flying Officer; Dec. 23rd.

Equipment Officers, 1st Class.—Temp. Lieut. J. D. Drysdale Gen. List, from the 2nd Class, and to be Temp. Capt. whilst so employed; Jan. 13th, 1917. 3rd Class: 2nd Lieut. W. Sillem, S.R.; Nov. 24th.

Memoranda.—The undermentioned to be Temp. 2nd Lieuts. (on prob.) for duty with R.F.C.:—Jan. 12th, 1917: Sergt. E. C. Ponking, from R. Defence Corps (T.F.); A. J. Annandale, late Temp. 2nd Lieut., R. Ir. Rif.

Supplementary to Regular Corps.—2nd Lieut. (on prob.) F. A. D. Grace is confirmed in his rank. The undermentioned to be 2nd Lieuts. (on prob.): J. E. J. Crawford; Sept. 3rd. Jan. 8th, 1917: H. F. L. Dixon, H. G. Day, S. V. Green. Jan. 10th, 1917: W. A. Merrill, H. D. B. Snelgrove. Jan. 12th, 1917: V. F. J. Barker, J. F. Crichton, H. Chapman, J. P. Clark, E. J. Dowty, H. G. Etheridge, E. L. M. Emtage, J. A. G. Harrison, W. C. Hacon, A. C. F. Hill, F. H. Isitt, G. Kitchin, Sir C. C. Mansel, Bt., L. Tunks.

London Gazette Supplement, January 27th.

Squadron Commanders.—From Flight-Coms., and to be Temp. Majors whilst so employed: Capt. W. D. S. Sanday, D.S.O., M.C., S.R.; Oct. 21st. Lieut. (Temp. Capt.) G. V. Rice, S. Mid. Brig., R.F.A. (T.F.); Oct. 25th. Oct. 26th: Capt. A. V. Holt, R. Highrs.; Lieut. (Temp. Capt.) O. T. Boyd, M.C., 5th Cav., Ind. Army; Capt. A. M. Morison, S.R. Temp. Capt. S. G. Gilmour, Gen. List; Oct. 28th. Lieut. (Temp. Capt.) H. L. Cooper, S.R.; Nov. 1st. Temp. Capt. H. A. Van Ryneveld, M.C., Gen. List; Nov. 4th. Lieut. (Temp. Capt.) R. Balcombe-Brown, M.C., R.F.A., S.R.; Nov. 17th. Temp. Capt. J. T. Rodwell, Gen. List; Nov. 19th. Temp. Capt. E. J. Tyson, M.C., Gen. List; Nov. 21st. 2nd Lieut. (Temp. Capt.) J. C. Quinell, R.A.; Dec. 1st. Dec. 17th: Capt. R. E. Orton, E. Lan. R.; Capt. J. R. Howett, S.R. Capt. F. H. Jenkins, M.C., S.R.; Jan. 1st, 1917. Capt. H. de Havilland, S.R.; Jan. 11th, 1917.

Flight-Commander.—Temp. 2nd Lieut. (Temp. Lieut.) G. A. Thompson, Gen. List, from a Flying Officer, and to be Temp. Capt. whilst so employed; Dec. 17th. (Substituted for the notification in the *Gazette* of Jan. 9th, 1917.)

Balloon Company Commanders (graded as Flight-Commanders).—From Balloon Officers:—Jan. 10th, 1917: Lieut. (Temp. Capt.) the Hon. E. G. W. T. Knollys, Lond. R. (T.F.); Temp. Lieut. O. Hook, Gen. List, and to be Temp. Capt. whilst so employed.

Adjutant.—Lieut. (Temp. Capt.) C. W. Wise, A.S.C., S.R. Nov. 10th.

Depôt Commanders.—From Park Coms., and to be Temp. Lieut. Cols. whilst so employed: Qmr. and Hon. Lieut. (Temp. Major) A. Fletcher, R.F.C.; Nov. 11th. Capt. (Temp. Major) G. C. R. Mumby, S.R.; Jan. 1st, 1917.

Inspecting Officers of Depôts (graded as Depôt Commanders).—From Depôt Coms., and to retain their temp. rank whilst so employed:—Jan. 1st, 1917: Capt. (Temp. Lieut.-Col.) R. C. Donaldson-Hudson, D.S.O. (T.F. Res.); Qmr. and Hon. Lieut. (Temp. Lieut.-Col.) A. Fletcher, M.C., R.F.C.

Park Commanders.—From Equipment Officers, 1st Cl., and to be Temp. Majors whilst so employed: Qmr. and Hon. Lieut.

(Temp. Capt.) A. Levick, R.F.C.; Nov. 7th. Lieut. (Temp. Capt.) G. D. Hannay, S.R.; Nov. 23rd.

Equipment Officers, 2nd Cl.—From the 3rd Cl.: 2nd Lieut. H. J. C. Smith, S.R., and to be Temp. Lieut. whilst so employed; Dec. 1st. Lieut. F. Tedman, S.R.; Jan. 7th, 1917.

3rd Class.—The appointment of Temp. 2nd Lieut. F. D. Reynolds, Gen. List, notified in the *Gazette* of Dec. 22nd, is cancelled.

London Gazette Supplement, January 28th.

Flight-Commander.—The initials of 2nd Lieut. G. T. R. Hill, M.C., S.R., are as now described, and not as in the *Gazette* of Jan. 11th, 1917. Capt. (Temp. Major) C. G. Bell, S.R., reverts from Sqdn. Com. to Flight-Com., and relinquishes his temp. rank; Jan. 11th, 1917, but with seniority from April 23rd, 1915.

Flying Officers.—Lieut. C. F. Pittman, S.R., from an Equipment Officer, 3rd Cl.; Nov. 9th. Jan. 4th, 1917: Temp. Lieut. J. W. Brown, Highland (Howr.) Brig., R.F.A. (T.F.), from a Flying Officer (Obs.), with seniority from April 5th, 1916; Temp. 2nd Lieut. J. B. Pierce, Gen. List; 2nd Lieut. F. A. D. Grace, S.R.; Temp. 2nd Lieut. (on prob.) A. J. Arkell, Gen. List; 2nd Lieut. C. C. L. Dowdall, R. Berks. R., and to be secd.; Temp. 2nd Lieut. H. C. Calvey, A.S.C., and to be transfd. to Gen. List. Jan. 5th, 1917: Capt. W. E. Salter, Norf. R. (T.F.); Temp. 2nd Lieut. G. H. Martingell, Gen. List. Jan. 6th, 1917: 2nd Lieut. J. G. Fair, D. of Lanc. Own Yeo. (T.F.); Temp. 2nd Lieut. L. P. Rendell, W. York. R., and to be transfd. to Gen. List; 2nd Lieut. (on prob.) C. A. Parker, R.F.A., S.R.; 2nd Lieut. G. M. Watt, S.R.

Memorandum.—J. H. Solomon to be Temp. 2nd Lieut. (on prob.) for duty with R.F.C.; Jan. 14th, 1917.

Supplementary to Regular Corps.—2nd Lieut. R. L. Burdon-Sanderson resigns his commission on account of ill-health; Oct. 27th. (Substituted for the notification in the *Gazette* of Oct. 26th.) 2nd Lieut. F. S. Schell resigns his commission; Jan. 30th, 1917.

Royal Flying Corps (Territorial Force).

London Gazette Supplement, January 24th.

The following announcement is substituted for that which appeared in the *Gazette* of Jan. 4th, 1917: C. A. Walker-Leigh (late Temp. Major, Local Res. Bn., R. Fus.) to be Major (Temp.), with precedence as from Sept. 25th, 1914, with the pay and allowances of a Capt., and to be Adjutant; Dec. 29th.

London Gazette Supplement, January 25th.

2nd Lieut. H. D. Teage to be Temp. Lieut.; Sept. 20th.

Central Flying School.

London Gazette Supplement, January 28th.

Instructors.—Temp. Capt. G. B. Hodgson, Gen. List, a Flight-Com., vice Temp. Lieut. (Temp. Capt.) J. C. Russell, R.E.; Sept. 22nd. Capt. A. C. Clarke, Welsh R., a Flight-Com., and to be secd., vice Temp. Capt. G. B. Hodgson, Gen. List; Oct. 2nd. Temp. Capt. (2nd Lieut., Res. of Officers) Lord G. H. L. Dundas, Gen. List, a Flight-Com., vice 2nd Lieut. (Temp. Capt.) S. G. Hodges, Wilts. R.; Oct. 15th. Lieut. (Temp. Capt.) D. A. L. Davidson, M.C., S.R., a Flight-Com., vice Capt. A. C. Clarke, Welsh R.; Nov. 1st. Lieut. (Temp. Capt.) A. M. Wilkinson, D.S.O., Hamps. R. (T.F.), a Flight-Com., vice Temp. Capt. (2nd Lieut., Res. of Officers) Lord G. H. L. Dundas, Gen. List; Dec. 2nd.



Fatal Accidents.

At an inquest held at Malmesbury on January 24th on Second Lieut. B. F. Parsons, R.F.C., it was stated that he was the passenger on a machine which fell in Charlton Park on the previous day. The machine had just re-started, a descent having been made to enquire the way, when the machine crashed to the ground. Apparently the engine failed, and in trying to turn the machine side-slipped. Second Lieut. Parsons died three hours later in hospital. The pilot, Second Lieut. C. B. Fenton, was seriously injured.

Lieut. P. Evans, R.F.C., was killed at Farnborough on January 25th. He was flying at a great height when his machine made a spinning nose-dive to the ground. Lieut. Evans was burnt to death.

A flying accident which occurred near a Yorkshire town on January 24th resulted in the death of the passenger, Corporal Potter, R.F.C. The pilot, Lieut. Metcalf, was seriously injured.

While testing a machine at Farnborough on the morning of January 28th Major Frank Goodden met with a fatal accident. According to one report, when Major Goodden was flying at a great height, one wing was seen to break, and the machine fell like a stone.

A Famous French Squadron.

THE announcement on Saturday that Lieut. Guynemer had brought down his thirtieth aeroplane, five of these having been destroyed by him between Tuesday and Friday, has led to some details becoming known regarding the famous "N 3" Squadron, to which he belongs. Up to January 1st the squadron had to its credit 83 German aeroplanes and three observation balloons, and the pilots of this squadron had fought 820 aerial battles. The commander is Major Brocard, who has destroyed several enemy machines. This squadron is able to boast that for every one of their number killed six German aviators have lost their lives.

Among the exploits of members of "N 3" Squadron are the following: Lieut. Guynemer, 30 machines; Lieut. Heurteaux, 19; Adjt. Dorme, 17; Lieut. Deulling, 10; Adjt. Chainat, 8; and Lieut. de la Tour, 7. According to Wolff, the leading performances of German military pilots are: Lieut. Wilhelm Frankl, 16 victories; Lieut. Hohndorf, 12; Capt. Bierr, 10; Lieuts. von Althaus and Berthold 8 each; Lieut. Dessembach, 7; Lieut. Baldamus, 6; and Lieut. Walz, 4. It should be noted, however, that these German pilots do not belong to one squadron.

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

British. *General Headquarters, January 24th, 9.20 p.m.*

"Very considerable aerial activity took place yesterday on both sides. In the course of air fighting one of our machines was brought down. Six German aeroplanes were destroyed and three German aeroplanes were driven down in a damaged condition. Another two of our machines are missing."

General Headquarters, January 25th, 9.10 p.m.

"There was much aerial activity yesterday on both sides. One enemy machine was brought down by our anti-aircraft guns, and in the course of air fights four other German machines were destroyed and three were driven down damaged. Three of our machines are missing."

General Headquarters, January 26th, 9.5 p.m.

"Yesterday our aeroplanes successfully bombed a number of places behind the enemy's lines. There were many air fights, in the course of which five German machines were destroyed, and five others driven down in a damaged condition. One of our aeroplanes is missing."

General Headquarters, January 27th.

"Hostile aircraft showed less enterprise yesterday. Much useful work was done by our aeroplanes, and two enemy machines were destroyed. Another enemy machine was forced to land in a damaged condition. Two of our machines are missing. Of the enemy machines destroyed since the 23rd inst., six fell on our side of the line."

General Headquarters, January 28th.

"Four German aeroplanes were destroyed yesterday in the course of air combats, three of which fell in our lines. Another hostile machine was driven down damaged."

General Headquarters, January 29th.

"Much successful work was accomplished by our aeroplanes yesterday, and some fighting took place in the air. One enemy machine was destroyed. One of our aeroplanes is missing."

French.

Paris, January 23rd.

"During the morning enemy aeroplanes dropped five bombs on Montdidier. A Fokker came down in our lines towards Fismes. Two or three German machines were brought down, one in an air fight in the neighbourhood of Marche-le-Pot, the other by our anti-aircraft guns near Amy (Oise)."

Paris, January 24th.

"During yesterday Lieut. Guynemer brought down his twenty-sixth German machine, which fell in flames near Maurepas. In the region of Verdun two other enemy machines were similarly brought down, one near Samogneux and the other in the Spincourt Forest. It is confirmed that on Jan. 22nd a German aeroplane, hit by the fire of our special guns, fell smashed to the ground north of Louvemont."

"During the same day 16 British naval aeroplanes bombed the blast furnaces at Burbach (basin of the Saar), which appear to have suffered considerable damage. One of our aeroplanes dropped projectiles during the night of Jan. 23rd-24th on the station at Dunsur-Meuse, the northern part of which was hit."

"During the day a German aeroplane was brought down in the neighbourhood of Vaux Cere (Aisne)."

Paris, January 25th.

"Lieut. Guynemer yesterday brought down a second German aeroplane near the station of Chaulnes. This makes the twenty-seventh enemy machine accounted for by this pilot. Lieut. Herteaux, during the same day, brought down his seventeenth enemy aeroplane, which fell to the ground, and was dashed to pieces near Parvillers."

Paris, January 26th.

"On the Somme front Lieut. Guynemer brought down in our lines near Lignières his twenty-eighth German aeroplane. It is confirmed that Lieut. Herteaux on the 24th brought down two enemy machines. The second of them fell to the ground 1,500 metres to the south of Rocquigny. Lieut. Herteaux also accounted for an aeroplane yesterday. This makes the nineteenth machines brought down by this aviator up to the present. A third and a fourth German aeroplane fell and were dashed to pieces as the result of encounters with our pilots. One dropped in our lines north of Altkirch and the other to the south of St. Etienne-à-Arnes (Ardennes). It is also confirmed that an aeroplane caught by one of our machines at short range with machine-gun fire on the 23rd fell to the north of Craonne."

"During the day of the 24th and the night of the 25th our bombarding squadrons carried out the following operations: 210 kilogrammes of projectiles were dropped on the

railway station of Briouilles, where a great fire was caused. The railway stations at St. Quentin and Voyennes, the huts at Liancourt-Fosse, the railway station and the huts at Guiscard, the railway station of Tergnier, and the military establishments to the south of Chauny were also plentifully bombarded."

"A German aeroplane was brought down west of Barleux by our anti-aircraft guns."

Paris, January 27th.

"During yesterday our chasing air squadrons had numerous decisive fights, in which five enemy aeroplanes were brought down. Two of these machines fell in the region of Verdun, one to the north of Gincrey and the other near Mont Facuon. Two of the others fell near Trosly-Preuil and near Carlepont (Oise). The fifth, attacked by Lieut. Guynemer, was obliged to come down in our lines near Doullens."

"The aviators, who were captured, confirmed that on the 25th an enemy machine attacked by Lieut. Guynemer was, as a matter of fact, brought down by him near Goyencourt. These two fresh successes bring to 30 the number of German aeroplanes which this pilot has accounted for up to the present."

"During the day of the 25th two of our aeroplanes bombarded the railway station and military workshops at Ham. A fire and a big explosion were observed."

Paris, January 28th.

"In the region of Moulinville a German aeroplane was brought down by the fire of one of our special guns."

Paris, January 29th.

"Yesterday Lieut. Gastin brought down in our lines a German aeroplane of the Albatros type. This is the fifth machine brought down by this pilot up to the present. Last night our bombarding aeroplanes dropped bombs on the railway stations of Athies, Savy and Etreillers."

"An enemy aeroplane was brought down by the fire of our artillery in the region of Danne Marie. Bombs were dropped on the open town of Lunéville, but nobody was hurt."

Belgian.

Havre, January 28th.

"The weather, which was cold, but clear, having again become favourable for aviation, our airmen were very active throughout the whole front. Our aeroplanes effectually assisted our batteries, and pursued several enemy machines."

Russian.

Petrograd, January 25th.

"At about 2 p.m. an enemy aeroplane was hit by our artillery, and descended into our lines in the region of the village Smolno (west of Brody). During its descent the machine caught fire from the flaming benzine. The pilot and the observer, who attempted to escape, were taken prisoners. Two machine guns in the aeroplane were secured by us."

Petrograd, January 26th.

"Hostile aeroplanes dropped bombs on the station of Radziviloff, without causing any damage."

Petrograd, January 28th.

"On the same day one of our Farman aeroplanes, in charge of aviator Ensign Plugin and Observer Staff Capt. Kiseleff, returning from a reconnaissance, were attacked by a German battleplane, with which they engaged in combat. After some machine-gun firing our aeroplane caught fire and fell in the region of the River Shara, south-east of Baranovich, in front of our wire entanglements. The dead bodies of the aviator and observer were brought in the same day."

"A German aeroplane dropped bombs on the station of Zamire, on the Alexandrovskaya Railway line."

German.

Berlin, January 25th.

"The clear weather favoured aerial activity on both sides."

Bulgarian.

Sofia, January 29th.

"In the Vardar Valley aerial activity. On the coast of the Aegean, between the Struma and Kavala, enemy aircraft were very active. A British aeroplane fell north of Kavala, and the airman was taken prisoner. The machine was undamaged."

Bombs on Baghdad.

Writing from Sann (via Basra) on January 20th, Mr. Edmund Candler says that on that morning our aeroplanes had bombed Baghdad citadel, which contained shell stores, a munitions factory and artillery barracks.

An Aeroplane in the Naval "Scrap."

THE Berlin *communiqué*, dealing with the destroyer action off the Dutch Coast on January 23rd, says:—

"One enemy destroyer was destroyed in the course of the battle, and a second one was observed by our aeroplanes after the battle to be in a sinking condition."

SOME PROBLEMS IN AEROPLANE CONSTRUCTION.

By CAPT. V. E. CLARK, CAPT. T. F. DODD, and O. E. STRAHLMANN.

(Continued from page 97.)

Metal construction for aeroplanes.—It is suggested that the field for development of steel or aluminium alloy in the structure of aeroplanes is one offering considerable inducement. The authors have gone briefly through the layout of an aeroplane in which every strength member is of metal. In this design it was found most convenient to use seamless steel tube at some places, welded tube at others, channel section at others, I-section and L-section at others. At a few points aluminium alloy was used, at other points pure aluminium, assumption being made that this aluminium was rolled in such a way as to give it certain desired physical characteristics. It is suggested that, even with the present standard method of construction, there is great room for improvement in the material and method of heat treatment of the metal fittings used in conjunction with wood and wire. Especially where fittings are bent both with and across the grain, a special alloy appears advisable. The same holds for fittings shaped by die forging. Chrome vanadium steel, to comply with S.A.E. specifications 6130, and heat treated in such a way as to render it best in each case, is suggested. It is believed that the total weight of an aeroplane can be materially decreased, without sacrifice of strength, and hence superior performance obtained, by the use of better steel. The construction of floats of metal for seaplanes appears to be a possibility as is also the use of metal for aeroplane propellers. It is possible that the entire body might be made of light pressed steel, or aluminium, with holes to decrease the weight cut at proper places, and covered with linen.

Flexible piping.—Satisfactory flexible gasoline lead has not yet been developed. Such a lead should resist the action of vibration, should be light in weight and resist cutting or denting. The method of making joints is important. The duct should be carefully sweated into proper terminal fittings. Tube ends of fittings should have spiral springs wound around them for at least $2\frac{1}{2}$ ins., thus preventing sharp bends and distributing the effects of vibration. All unions should be ground, which spherical seats, and threads should be cut clear and sharp, with all burrs removed. The inside diameter of tube should not be less than 0.35 in. A flexible pipe, light in weight, of material suitable for leading the exhaust away from the engine would be useful.

Muffler requirements.—In military service a hostile aeroplane is usually first discovered by hearing it. A muffler satisfactory as to low weight, flexibility, loss of power through back pressure, durability against corrosion and efficiency as a muffler is highly desirable.

Shock absorbers for landing gear.—Rubber is not satisfactory as a shock absorber for heavy aeroplanes. Neither is it satisfactory as a military supply, especially when it is subjected to heat and the direct rays of the sun. It seems necessary to develop a steel-spring shock absorber. The action of this steel spring must, however, be damped by an oil cylinder. Without this damping the action is such as to cause the aeroplane to bound excessively upon striking the ground.

Brakes required when landing.—The development of a brake to reduce the run of the aeroplane after it has touched the ground, thus permitting it to land in restricted areas, appears to be a difficult problem. It is a moot question whether such a brake is desirable when the simple two-wheel landing gear is used, as its action has a tendency to throw the aeroplane over on its nose. Where more than two wheels are used, however, a brake fitted to the two main rear outside wheels in such a way that the pilot can, from his seat, operate either brake, or both brakes together, would be desirable. Such an arrangement would permit him not only to stop his machine quickly, but also to steer it on the ground to some extent.

Folding landing gear.—The development of a landing gear that can be submerged within the body by the pilot, during flight, would materially increase the speed of the aeroplane by reducing the "parasite" resistance. Such a mechanism should be light in weight, sturdy and simple.

Gasoline-supply gauge.—The development of a gauge to indicate the supply of gasoline remaining in the tanks to the pilot, whose seat can be out of view of the tanks, is necessary. Such a gauge should be simple and sturdy. The accuracy and reliability with which it registers should not be affected by any change in altitude of the aeroplane. It should not form a possible source of leakage. It should be adapted to both the pressure and suction systems of feed.

Fire safety device.—Many casualties have occurred because

the aeroplanes have caught fire in the air. While it has been impossible to determine from the wreck just what led to the fire, it is quite probable that many of these accidents were due to back fire into the carburettor that forced burning gasoline out into the surrounding structure, or to a leaking gasoline tank. The development of a device that will render such an accident impossible would save many lives. In this connection it should always be a rule for aeroplane constructors never to have any electric lead near a gasoline supply or lead.

Altitude adjustment for carburettor.—The development of a device to regulate automatically the mixture for variations in density of air incident to changes in altitude would be valuable.

Device for firing machine gun by engine shaft.—A system by which machine guns would be fired by positive action of one of the engine shafts is necessary on a single-tractor screw machine on which it is proposed to fire through the disk of the propeller. The most convenient way would probably be to fire from a camshaft, as it is believed that fire at the rate of 600 per minute is the reasonable limit. The firing pin on the gun should strike the primer at the instant that the rear edge of the blade passes the line of fire of the gun. The propeller should be two bladed for this work. Such a device should be simple, durable and reliable.

Vibration-absorbing material.—The development of a material more suitable than ordinary felt for padding the points of support of radiators, and the like, is highly desirable.

Variable radiators.—A more suitable method of permitting the pilot to adjust the amount of cooling done by the radiator in order to compensate for changes in temperature of air, or changes in speed through the air, is necessary. Such arrangement should permit operation by the pilot from his seat during flight, or, better yet, might be automatic; the



Fig. 3.—Variable forms of aerofoil sections.

device being operated as a function of the temperature of the water. It should be durable and should act with reliability.

Variable-camber wing.—Great speed range is a desirable attribute of an aeroplane, as it permits high speed of travel in the air and yet low speed while landing, which, of course, makes for safety if the landing place be small or rough. Great improvement in the speed range can be brought about by use of a variable-camber wing surface, that is to say, if

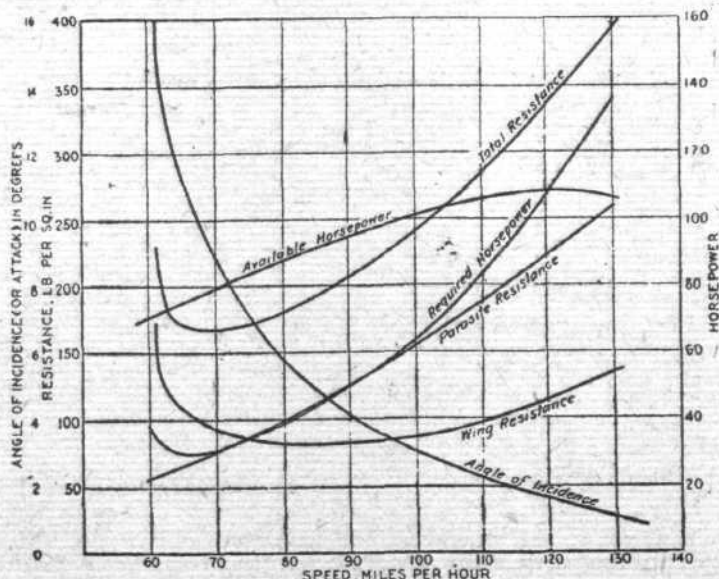


Fig. 4.—Performance curves for aeroplane with fixed-camber wing.

the section form of the aerofoil could be changed at will during flight from a shape such as A to one similar to B, Fig. 3.

An aerofoil such as shown in B has a high lift coefficient at large angles of attack (the angle of attack being the angle between the chord tangent to the lower surface and the relative wind). At small angles of attack, where the lift coefficient is low, this shape has a relatively high resistance, and will consequently require a great power to drive it through the air at speed high enough for the necessary support. The reverse is true of such a shape as A, which, though the lift coefficient is poor, has an appreciably lower resistance or "drag." If, then, we could utilise the section B for slow speed, as in making landings, and section A for high speed, the safe limits of speed between which the aeroplane could fly would be extended. The variable camber would permit changing the characteristics of the wing to suit conditions. Performance curves (Figs. 4 and 5) have been worked out for a pursuit machine having a good aerofoil (fixed camber) in common use to-day; and a similar series of curves for a machine with an assumed variable-camber wing. It has been assumed that otherwise both aeroplanes are similar. No allowance has been made for the probable increase in weight of the variable-camber machine due to the operating mechanism and structure. The slow speed of the fixed-cambered wing aeroplane is 61 m.p.h. This will only permit landing the aeroplane on an ideal field by a very skilful pilot. On the other hand, the variable-cambered wing aeroplane can be flown at a slow speed of 56 m.p.h. The curves show that with the variable camber a higher speed, 127 m.p.h., as against 120 for the fixed camber, can be obtained with the same power. The same speed might be obtained with less power. If the same high speed were desired the variable-camber wing might have a greater area.

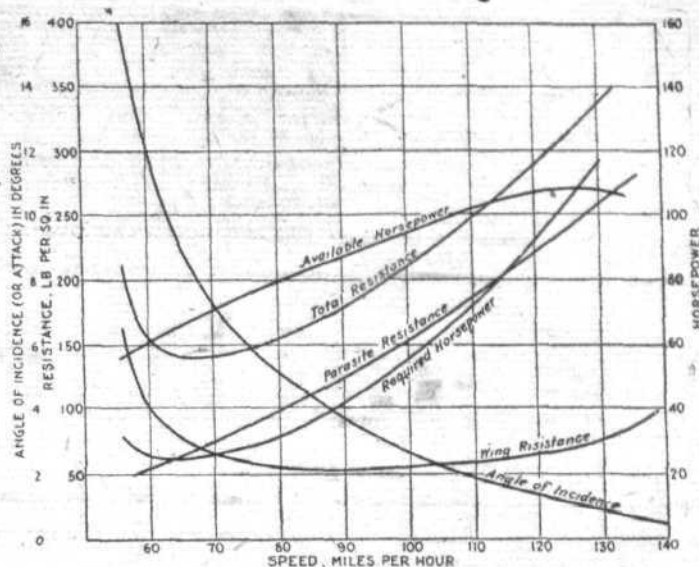


Fig. 5.—Performance curves for aeroplane with variable-camber wing.

It would then have a slow speed of 46 m.p.h., as against 61 for the fixed camber (allowing for increased weight due to added surface), which would permit its being flown and being landed in an ordinary field, by the ordinarily skilful pilot. It can, therefore, be seen that the invention of a suitable variable-cambered wing would be a big step in advance. (To be continued.)

R.N.A.S. AND R.F.C. WINTER COMFORTS FUND.

In November last the Committee of Management of the Society of British Aircraft Constructors, Ltd., made an appeal for donations to the Winter Comforts Funds of the R.N.A.S. and R.F.C., which provide comforts for men at the Front and prisoners of war belonging to the British Air Services. Lady Henderson is the President of the Royal Flying Corps Fund, while the Royal Naval Air Service Fund is under the care of Mrs. Murray Sueter.

In response to this appeal a total sum of £6,785 has been received by the S.B.A.C., and the following is a complete list of subscribers:—

£210 each: Aircraft Manufacturing Co., Ltd.; W. H. Allen, Son and Co., Ltd.; Austin Motor Co., Ltd.; Beardmore Aero Engine, Ltd.; Boulton and Paul, Ltd.; British and Colonial Aeroplane Co., Ltd.; Crossley Motors, Ltd.; Gnome and Le Rhone Engine Co.; Gwynnes, Ltd.; D. Napier and Son, Ltd.; Handley Page, Ltd.; Parnall and Sons; A. V. Roe and Co., Ltd.; Short Bros.; Siddeley-Deasy Motor Car Co., Ltd.; Sopwith Aviation Co., Ltd.; Sunbeam Motor Car Co., Ltd.; Vickers, Ltd.; Whitehead Aircraft, Ltd.; Wolseley Motors, Ltd.

£105 each: Accles and Pollock, Ltd.; Coventry Ordnance Works, Ltd.; Darraq Motor Engineering Co., Ltd.; Dudbridge Iron Works, Ltd.; Engineering Timber Co., Ltd.; Grahame-White Aviation Co., Ltd.; Kayser, Ellison and Co., Ltd.; Martinsyde, Ltd.; Robey and Co., Ltd.; Gordon Watney and Co., Ltd.; Westland Aircraft Works (Petters, Ltd.).

£100: G. and J. Weir, Ltd.

£52 10s. each: Benton and Stone, Ltd.; Blackburn Aeroplane and Motor Co., Ltd.; Bullivant and Co., Ltd.; Cellon, Ltd.; Thos. Firth and Sons, Ltd.; Hooper and Co., Ltd.; Mann, Egerton and Co., Ltd.; G. D. Peters and Co., Ltd.; S. E. Saunders, Ltd.; Waring and Gillow, Ltd.; Wells Aviation Co., Ltd.

£50 each: Brazil, Straker and Co., Ltd.; Wm. Jessop and Sons, Ltd.; Alexr. Stephen and Sons, Ltd.

£26 5s. each: J. Gliksten and Son, Ltd.; Fredk. Sage and Co., Ltd.; Willans and Robinson, Ltd.

£25 each: Alfred Herbert, Ltd.; Wm. Mills, Ltd.; Fredk. Mountford, Ltd.

£21 each: Robinson, David and Co., Ltd.; Skefko Ball-Bearing Co., Ltd.

£20 each: Thomas Smith's Stamping Works, Ltd.; Wylie and Lochhead, Ltd.

£10 10s. each: Albion Drop Forgings Co., Ltd.; J. Beardshaw and Son, Ltd.; Clarke, Cluley and Co.; Coventry Swaging Co., Ltd.; Fellows Magneto Co., Ltd.; Gardiner, Sons and Co., Ltd.; Gloucestershire Aircraft Co.; Integral Propeller Co., Ltd.; John Lysaght, Ltd.; Mendine Co.; Nettlefold and Sons, Ltd.; Park Royal Engineering Works,

Ltd.; Pulvo Co., Ltd.; Charles Richards and Sons, Ltd.; Rotherham and Sons, Ltd.; Rubery, Owen and Co.; S. Smith and Sons, Ltd.; Tubbs, Lewis and Co.; Whiteman and Moss, Ltd.; Woodside Engineering Co., Ltd.; Yorkshire Engineering Supplies, Ltd.; Major J. G. Weir.—£5 5s. each: Edgar Allen and Co., Ltd.; Bowden Wire, Ltd.; Fox, Elliott and Co., Ltd.; John Garrington and Sons, Ltd.; Thos. J. Gardner; Godley and Goulding; Ernest H. Hill, Ltd.; Henry Hughes and Son, Ltd.; Arthur Lee and Sons, Ltd.; Llewellyn and James, Ltd.; Wm. Moss; J. Payen; Sanderson Bros. and Newbould, Ltd.; Short and Mason, Ltd.; H. C. Slingsby; Stephenson and Sons, Ltd.; Swift, Levick and Sons; G. P. Wall; F. Westbury and Son.—£5 each: Morris and Co. (Decorators), Ltd.; Moss Gear Co., Ltd.; Oliver Arc Lamp, Ltd.—£3 3s. each: The Civil, Nautical and Mechanical Engineering Co., Ltd.; George Spicer.—£2 2s. each: James Clews and Sons, Ltd.; Wm. Kenyon and Sons, Ltd.; Midland Presswork Co.; Omnium Central; David Petrie; Stokes and Holt, Ltd.—£1 1s. each: Grace and Marsh; M. Mole and Son.—10s.: J. G. Ingram and Son. Total, £6,785.

Of the foregoing sum, £853 2s. 6d. was earmarked in favour of the Royal Flying Corps Fund and £275 12s. 6d. in favour of the Royal Naval Air Service Fund.

Inquiries were made as to the proportion in which the total sum received should be divided between the two Funds, and having regard to all the circumstances the Committee of Management have distributed the money as follows:—

To Lady Henderson, for the Royal Flying Corps Fund	£4,680
To Mrs. Murray Sueter, for the Royal Naval Air Service Fund	2,105
	£6,785

Lady Henderson writes that the amount subscribed by the industry has made all the difference to her work, and that it has enabled her to carry out many large requisitions from the Front, while Mrs. Sueter also expresses her thanks to all the donors, and says that the amount will enable her largely to run the R.N.A.S. Fund through the winter.

The Committee of Management desire to add their own thanks for the ready and generous response to their appeal.

R.F.C. Recruits from the Rand.

A CALL for 100 South Africans for the Royal Flying Corps has met with a ready response at Johannesburg and along the Reef, writes the *Daily Telegraph* correspondent in Johannesburg. Capt. Miller, now in Johannesburg, had permission to recruit 30, but the number was subsequently increased, as 100 were required. Capt. Miller has already received 800 applications.

SIDE-WINDS.

It is becoming quite a habit for prominent people when up North to visit the works of the Blackburn Aeroplane Co. at Olympia, Leeds. Among those taking the opportunity recently of seeing a modern aeroplane factory were Viscount and Lady Bryce. In passing through the various shops, Lord Bryce was keenly observant of the many labour-saving devices which are utilised, and frequently commented upon the ingenious nature of much of the machinery employed. He was particularly interested in the process of building the well-known Blackburn propellers, while the machine which is to be presented to the Government of India by the Chamber of Commerce on behalf of the merchants and manufacturers of the city, came in for special examination.

From Whitehead Aircraft, Richmond, Surrey, comes an attractive little calendar, which is decorated by six little panels depicting in colour the destruction of the German airship at Cuffley by Lieut. W. L. Robinson, V.C., on September 3rd, 1916. The first picture shows the airship being caught by the searchlights, while the others depict the progress of the destruction until the final plunge of the blazing mass to the ground. It is a souvenir of a historic event, and will not fail to have a place found for it by anyone fortunate enough to secure a copy.

It is gratifying to hear that the Rivers Engineering Co., of Lots Road, Chelsea, are going ahead strongly. Extensions are already the order of the day in the aviation department in order to cope with the demand for the various components which are being manufactured. Under the guidance of Mr. Walter R. Jones, who is now managing-director, energetic development in all directions may be looked for.

Experientia docet, says the old tag, and if satisfaction is required it is as well to take advantage of experience. This applies to "small ware" as much as to anything else, and that is why attention is drawn to Messrs. John MacLennan and Co., of 30 and 31, Newgate Street, London, E.C., who are specialists in the class of tapes, cords and threads which are required for aircraft work, and which are manufactured, for the most part, to R.A.F. and Admiralty specifications. They have supplies of these always either in stock or in work, and so have the advantage of being able to give prompt attention to all orders and enquiries. In addition the firm stock insulating tapes for electrical work, and shell tapes and webs as used in munition factories.

Those who want to take advantage of Messrs. Burberry's half-price sale should not hesitate too long, as although there are a number of bargains left, the stock is rapidly dwindling. The whole of Burberry's stock of men's and women's 1916 garments, as well as a number of models from short lengths of cloth, have been brought down to clearing prices. Anyone requiring a reliable weatherproof, a distinguished top-coat for everyday use, a motoring wrap, a sporting suit or a smart, modish gown in return for a small outlay, cannot do better than write to Burberry's for a copy of their sale catalogue, or, if time permits, spend a half hour at this famous Haymarket house, inspecting the multitude of bargains offered.

BOWDEN WIRE, LTD., announce that, being wholly engaged upon production for the British and Allied Governments, they are unable to execute any orders for private purposes until further notice. They have in stock certain goods suitable for replacements. Customers are invited to state their requirements in this respect, and, if possible, these will be met. Orders for complete Air Inlets cannot be filled.

MORE developments in aerodrome land, and one that looks like a sound proposition, for the reason that Messrs. Barningham, whose huge premises in Albany Street were so well known in the past as "Friswell's," have purchased some 150 acres of ground up Kingsbury way for aerodrome purposes, and for erecting thereon a splendidly-equipped aeroplane factory. Incidentally we hear they are erecting what is believed to be the largest hangar in this country. It is also whispered that when more peaceful times arrive a country flying and sporting club will be organised. In the meantime the factories will be full upon more immediate requirements. The title of the new company responsible for the undertaking is the Kingsbury Aviation Company, and for convenience sake they have London offices at 175, Piccadilly, W.

Stealing Flying Corps Petrol.

THE *Times* reports that two Englishmen have been sentenced at Cairo to 12 months' imprisonment for stealing and selling petrol belong to the Flying Corps.

Aeronautical Society's Developments.

At the lecture given by Brig.-Gen. W. S. Brancker before the Aeronautical Society last week, Major-Gen. Ruck, C.B., C.M.G., said that the lecture was the first of a series to be given on alternate Wednesdays in the Lecture Theatre of the Society of Arts, John Street, Adelphi. A full programme of the lectures, the subjects of which have been selected with the approval of the Naval and Military authorities, will be published shortly.

The next meeting will be held on Wednesday, February 7th, when Mr. F. Handley Page will lecture on "The Case for the Large Aeroplane."

In conjunction with the Society of British Aircraft Constructors, the Society is also proposing to organise local centres and student sections.

Major-Gen. Ruck also said that within two months it was hoped that the Society would be in possession of larger and more suitable premises in a more convenient neighbourhood. The financial aspect was very satisfactory, which was due in large measure to the assistance received from the War Office.

The Lights of London.

AN order was made by the Home Secretary on January 25th varying the time during which lights must be reduced, shaded, or obscured. The times at which lights must be shaded is now January, 6.0 p.m.; February, 6.30 p.m.; March, 7.30 p.m.; April, 8.30 p.m.; May, 9 p.m.; June, 9.30 p.m.; July, 9 p.m.; August, 8.30 p.m.; September, 7.30 p.m. Greenwich mean time, and the lights must be kept shaded till one hour before sunrise.

A Picture from the Front.

MR. PHILIP GIBBS, writing to the *Daily Telegraph* from British Headquarters in France on January 26th, says:—

"Yesterday and to-day there were some hours of sunlight, when all the snowfields were sparkling so that one's eyes were blinded a little by this bright, white landscape. There was no visibility. Our kite-men could see nothing from their baskets, not even the flash of guns that went booming out sullenly all day long. German aeroplanes took advantage of the weather and came sneaking low through the white mist, hoping to drop bombs before our flying men could see and chase them, or our 'Archies' get their target. They took the risk and paid the price. Four of them were caught and put down. I saw one trying to escape, followed very closely by the white puff-balls of our shrapnel."

PUBLICATIONS RECEIVED.

Catalogue of Exhibition of the Earliest and Latest Aeronautical Paintings and Prints, in aid of the Flying Services Fund and the Irish Hospital Supply Depôts. Grosvenor Gallery. Collected and Arranged by the Countess of Drogheda.

Annual Report of the Smithsonian Institution, 1915. Washington, D.C., U.S.A.: The Smithsonian Institution.

Aeronautical Patents Published.

Applied for in 1915.

Published February 1st, 1917.

14,157. F. CAPRONI. Flying-machine construction.

Applied for in 1916.

The numbers in brackets are those under which the specification will be printed and abridged, &c.

Published February 1st, 1917.

11,691. SOC. DE PARIS ET DU RHONE. Magneto-ignition systems. (108,606.)

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